STORMWATER REPORT

Proposed Self-Storage Facility

34 Dudley Street, Arlington, MA

PREPARED FOR

PSI Atlantic Arlington MA, LLC
530 Oak Court Drive
Suite 155
Memphis, TN 38117

PREPARED BY

2 Bedford Farms Drive
Suite 200
Bedford, NH 03110
603.391.3900

February 2022
Revised April 21, 2022

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Project Benefits

Enhance Water Quality

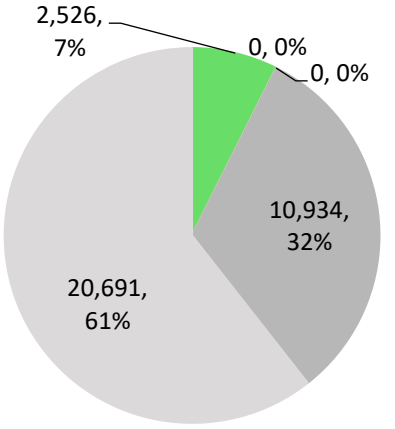
- Exceeds treatment standards set forth in MS4, TMDL, and Massachusetts Stormwater Standards
  - **60%** Phosphrous removal
  - **>80%** TSS removal
- Improvement of water quality for human health and ecological function
- LID features such as bioretention and an reduction of impervious areas

Peak Rate (and Volume) Attenuation

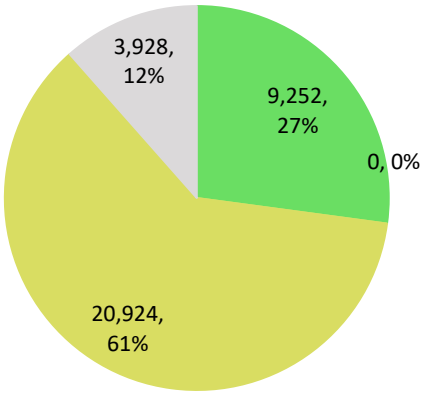
- Proposed 10 year storm flow rates are less than existing 2 year storm flow rates
- **312%** increase in pervious area on site
- Reduction in stormwater volume by incorporating a bioretention basin and subsurface infiltration basin

Protect Natural Resources

- Reduction of impervious surface in Riverfront Area
- Stabilization of existing, unstable slope
- Enhancement of upland vegetated transitions
- Enhance wildlife habitat
- Landscaping to include native species promoted by the Conservation Commission



Existing Conditions Areas (SF)



Proposed Conditions Areas (SF)

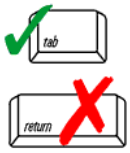
Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

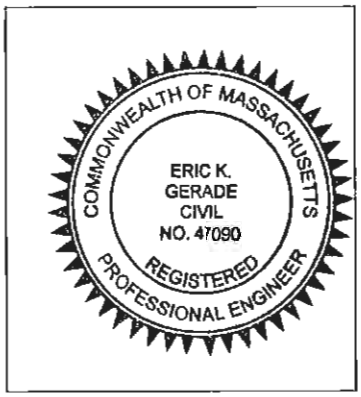
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



4/21/2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☒ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☒ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

☐ Limited Project

☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.

☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area

☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff

☐ Bike Path and/or Foot Path

☒ Redevelopment Project

☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☐ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Stormwater Report Narrative

This Stormwater Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). This report also demonstrates compliance with the Town of Arlington Stormwater Management Standards.

Project Description

The Applicant, PSI Atlantic Arlington MA, LLC, is proposing to construct a Self-Storage redevelopment (the Project). As proposed, the Project consists of 92,858 square feet of building space, ancillary landscape improvements, parking spaces (23), and stormwater management and utility improvements to support this use.

The Project will entail the construction of a five story self-storage facility with associated parking and is not considered a Land Use with Higher Potential Pollutant Loads (LUHPPL).

Site Description

The Project Site is a 0.78-acre parcel of land (the Site) located within the Industrial zoning district at 34 Dudley Street in Arlington, Massachusetts (see Figure 1). The Site lies within the surface watershed of Mill Brook and is bounded by Dudley Street to the north, Mill Brook to the south, and commercial and residential uses to the east and west. See Figure 1, Site Locus Map.

Wetland Resource Areas on the Site include the following:

The resource areas identified on or near the Project Site subject to state regulations under the WPA include Bank and Riverfront Area. The resource areas are defined under the WPA (310 CMR 10.00) as follows:

- **Bank**: As defined at 310 CMR 10.54 (2), *"a Bank is the portion of the land surface which normally abuts and confines a water body … The upper boundary of Bank is the first observable break in slope or the mean annual flood level, whichever is lower."*
- **RA:** As defined by 310 CMR 10.58 (2)(a)(3), Riverfront Area is *"the area of land between a river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away…"*

An additional resource area established under the Bylaw is the 100-foot adjacent upland resource area. For the purposes of this NOI, the URA has been broken down into separate buffer zones. These areas are defined as follows:

- 25-foot No Disturb Zone (NDZ) – the innermost 25 feet of the 100-foot URA
- 50-foot No Build Zone (NBZ) – the inner 50 feet of the 100-foot URA
- 100-foot URA – land within 100 feet of a resource area

Wetlands and their buffer zones on/adjacent to the property are described in more detail in the Notice of Intent narrative, bound separately.

Table 1 Existing Conditions Hydrologic Data

Name	Critical Area (yes/no)	Zone 1 or Zone A (yes/no)	ORW or SRW (yes/no)	Zone II or IWPA (yes/no)	Other
Mill Brook	No	No	No	No	*Impaired Waterbody (MA71-07)* *Benthic Macroinvertebrates* *Escherichia Coli (E. Coli)N/A*

According to the National Resources Conservation Service (NRCS), surface soils on the Site include Merrimac-Urban land complex and Udorthents. On-site soils are classified as Hydrologic Soil Groups (HSG D) . To support the redevelopment and in accordance with the Town of Arlington Inland Wetland District, a subsurface geotechnical investigation was performed by GeoEngineers, Inc, Boston, MA, and advanced borings in monitoring wells in December 2021 and January 2022. The results of the soil boring analysis, the soils on the site are classified as HSG A soils with an infiltration rate of 2.4 inches per hour. The Geotechnical Report is included in Appendix C, the Site is not considered to be within an area of rapid infiltration (soils with a saturated hydraulic conductivity greater than 2.4 inches per hour).

Existing Drainage Conditions

Under existing conditions, the Site is developed and predominately impervious with generally flat topography. Just to the south of the southerly property boundary, there is a steep slope down to Mill Brook. Figure 2 illustrates the existing drainage patterns on the Site. Currently, the Site is divided into two drainage areas as stormwater runoff flows to two Design Points, which have been identified as Dudley Street (DP-1) and Mill Brook (DP-2). Table 2 below provides a summary of the existing conditions hydrologic data.

Table 2 Existing Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
EX-1	Dudley Street	DP-1	0.325	97	5.0
EX-2	Mill Brook	DP-2	0.459	96	5.0

Proposed Drainage Conditions

Figure 3 illustrates the proposed "post construction" drainage conditions for the project. As shown, the Site will be divided into 5 drainage areas that discharge treated stormwater to the 2 existing Design Points. Table 3 below provides a summary of the proposed conditions hydrologic data.

Table 3 Proposed Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
PR-1	Mill Brook	DP-2	0.480	98	5.0
PR-2a	Mill Brook	DP-2	0.084	80	5.0
PR-2b	Mill Brook	DP-2	0.105	80	5.0
PR-3	Mill Brook	DP-2	0.006	98	5.0
PR-4	Mill Brook	DP-2	0.068	98	5.0
PR-5	Dudley Street	DP-1	0.040	87	5.0

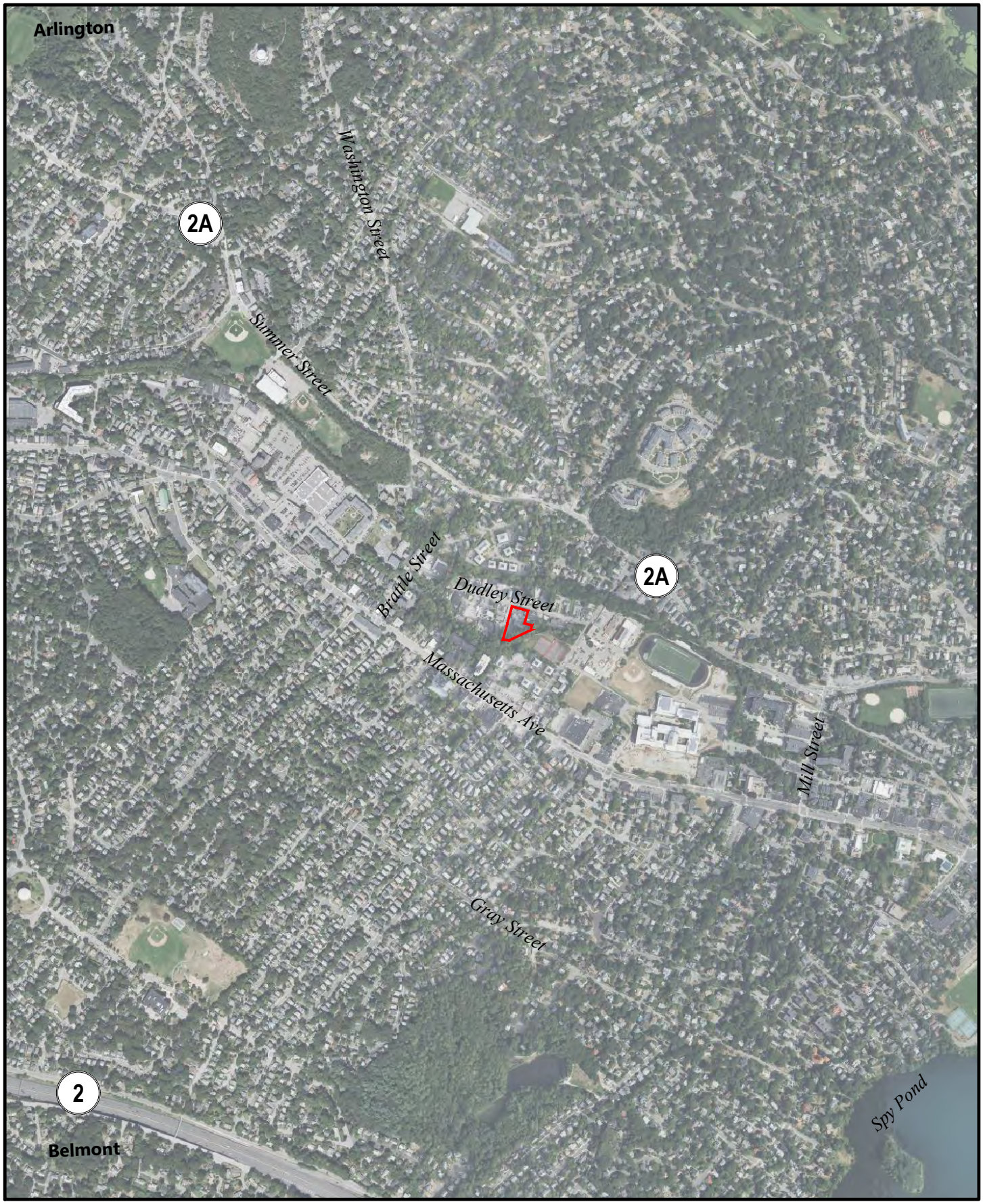
The site design integrates a comprehensive stormwater management system that has been developed in accordance with the Massachusetts Stormwater Handbook. The proposed stormwater management system has been designed to treat the half inch Water Quality Volume.

Environmentally Sensitive and Low Impact Development (LID) Techniques

Low Impact Development (LID) techniques and stormwater Best Management Practices (BMPs) implemented into the site design include reduction of impervious area, minimized disturbance to existing trees and vegetation, and bioretention basins. One of the bioretention basins has been incorporated, as recommended by the Zoning Bylaws, to collect stormwater from the parking area and the other collects runoff from the side yard setback and rear of the property. In general, stormwater from the proposed impervious surfaces is collected in a bioretention basin or deep sump hooded catch basins, prior to being discharged into a subsurface infiltration basin

with an isolator row. The deep sump hooded catch basin and isolator row provide pretreatment prior to final treatment by the infiltration basin. Additionally, the bioretention basin has a sediment forebay for pretreatment prior to final treatment by the bioretention basin soil media. The overflow from the bioretention basin is connected to the larger subsurface infiltration basin to control larger storm events and provide additional water quality benefits. The southerly bioretention basin is allowed to overtop during larger storm events and flow overland towards the rear of the property, similar, to the existing flow path. The subsurface infiltration basin has an outlet control structure to control the rates of flow and ensure proper water quality volume, prior to discharging to the existing pipe discharge to the south of the property towards Mill Brook.

\\vhb\gbl\proj\Bedford\52816.00 Arlington Self-Storage\cad\ld\Planmisc\52816.00 Site Location Map.dwg



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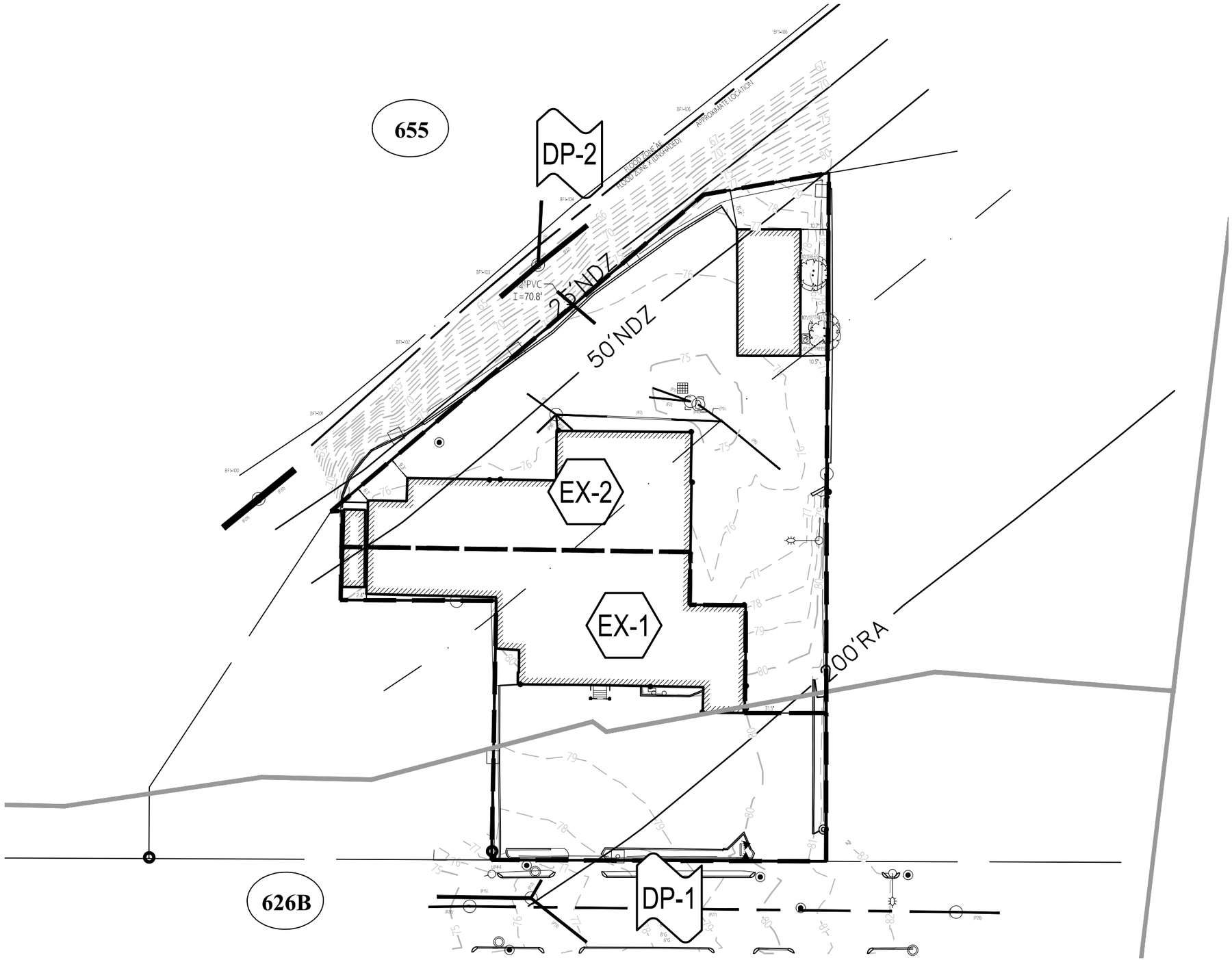
Site Location Map
DEP Permitting
Arlington Self Storage Facility
Arlington, MA

Figure 1

02/09/2022

0 500 1000 2000 Feet



Legend

SYMBOLS

- X — **DESIGN POINT**
- X — **DRAINAGE AREA DESIGNATION**
- X — **POND**

LINETYPES

- **DRAINAGE AREA BOUNDARY**
- **TIME OF CONCENTRATION FLOW LINE**
- **SOIL TYPE BOUNDARY**
- **100' BUFFER ZONE**
- 4–220 4–219 — **WETLAND BOUNDARY**

SCS SOIL CLASSIFICATIONS

- 626B — **MERRIMAC-URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES, HSG A**
- 655 — **UDORTHENTS, WET SUBSTRATUM**

0 20 40 80 Feet

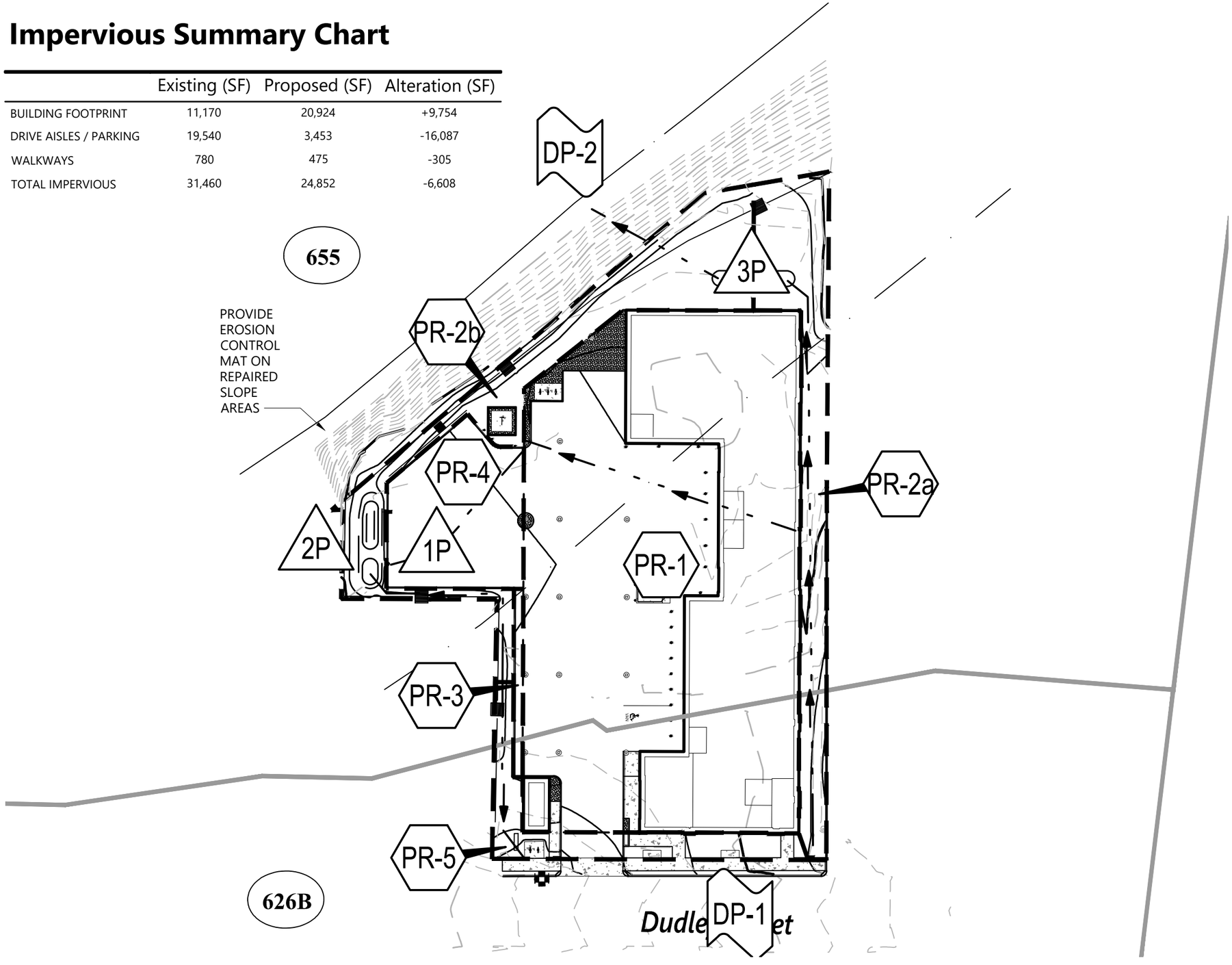
Existing Drainage Conditions — **Figure 2**

Proposed Self Storage Facility
Arlington, Massachusetts

02/09/2022

Impervious Summary Chart

	Existing (SF)	Proposed (SF)	Alteration (SF)
BUILDING FOOTPRINT	11,170	20,924	+9,754
DRIVE AISLES / PARKING	19,540	3,453	-16,087
WALKWAYS	780	475	-305
TOTAL IMPERVIOUS	31,460	24,852	-6,608



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0 20 40 80 Feet

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Proposed Drainage Conditions — **Figure 3**

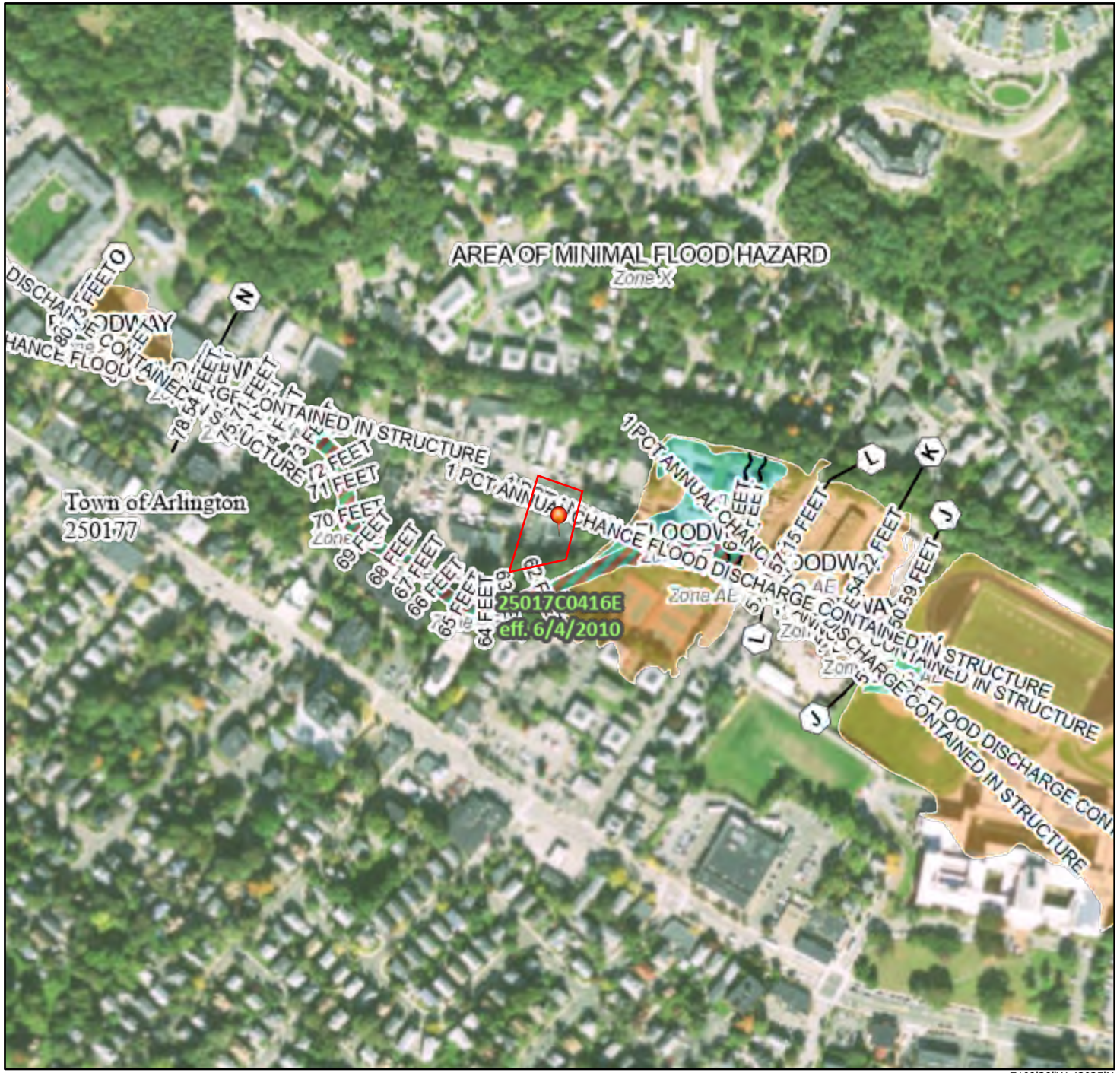
Proposed Self Storage Facility
Arlington, Massachusetts

02/09/2022
REV 04/21/2022

National Flood Hazard Layer FIRMette

FEMA

71°10'17"W 42°25'27"N



71°9'39"W 42°25'N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/9/2022 at 10:06 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FIGURE 4

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Regulatory Compliance

Massachusetts Department of Environmental Protection (DEP) – Stormwater Management Standards

As demonstrated below, the proposed Project fully complies with the DEP Stormwater Management Standards.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The Project has been designed to comply with Standard 1.

The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Supporting information and computations demonstrating that no new untreated discharges will result from the Project are presented through compliance with Standards 4 through 6.

All proposed Project stormwater outlets and conveyances have been designed to not cause erosion or scour to wetlands or receiving waters. Outlets from closed drainage systems have been designed with flared end sections and stone protection to dissipate discharge velocities.

Computations and supporting information for the sizing and selection of materials used to protect from scour and erosion are included in Appendix A.

Standard 2: Peak Rate Attenuation

The Project has been designed to comply with Standard 2.

The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25 and 100 years. The results of the analysis, as summarized in Table 4 below, indicate that there is no increase in peak discharge rates between the existing and proposed conditions. The analysis was updated to utilize NOAA Atlas 14+ precipitation depths for the site: 3.64, 5.79, 7.49, and 10.35 inches, for the 2, 10, 25 and 100-year storm events, respectively.

Computations and supporting information regarding the hydrologic modeling are included in Appendix B.

Table 4 Peak Discharge Rates (cfs*)

Design Point	2-year	10-year	25-year	100-year
Design Point: Dudley Street (DP-1)				
Existing	1.17	1.89	2.46	3.41
Proposed	0.11	0.21	0.28	0.40
Design Point: Mill Brook (DP-2)				
Existing	1.64	2.66	3.47	4.82
Proposed	0.53	1.60	2.98	4.79

Standard 3: Stormwater Recharge

The Project has been designed to comply with Standard 3.

In accordance with the Stormwater Handbook, the Required Recharge Volume for the Project is 1,243 cubic feet.

Recharge of stormwater has been provided through the use of a bioretention basin and subsurface infiltration basin, which have been sized using the Static method. Each infiltration BMP has been designed to drain completely within 72 hours. Table 5 below provides a summary of the proposed infiltration BMPs utilized for the Project.

Table 5 Summary of Recharge Calculations

Infiltration BMP	Provided Recharge Volume (cubic feet)
Subsurface Infiltration Basin	1,954
Total Provided Recharge	**1,954**
Total Required Recharge	**1,243**

Geotechnical Engineering Report, computations, and supporting information are included in Appendix C.

Standard 4: Water Quality

The Project has been designed to comply with Standard 4.

The proposed stormwater management system implements a treatment train of BMPs that has been designed to provide 80% TSS removal of stormwater runoff from all proposed impervious surfaces.

Computations and supporting information, including the Long-Term Pollution Prevention Plan, are included in Appendix D.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The Project is not considered a LUHPPL.

Standard 6: Critical Areas

The Project will not discharge stormwater near or to a critical area.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The Project has been designed to comply with all ten of the Stormwater Management Standards.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

The Project will disturb approximately 0.8 acres of land and is not required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. In lieu of the Stormwater Pollution Prevention Plan (SWPPP) required under NPDES, a Construction Period Pollution Prevention and Erosion Sedimentation Control Plan has been included in Appendix F.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the Project. The O&M Plan is included in Appendix D as part of the Long Term Pollution Prevention Plan.

Standard 10: Prohibition of Illicit Discharges

Sanitary sewer and storm drainage structures which were part of the previous development on this site are to be completely removed during the site redevelopment. The design plans submitted with this report have been designed in full compliance with current standards. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges.

Local Municipal Rules and Regulations

The following document intended to assist applicants and their consultants by providing Stormwater Management/Mitigation design guidelines, submission requirements, and review procedures in accordance with The Town of Arlington By-Law Title V, Article 15, Section 4.

The design and function of the stormwater drainage system shall conform to the following requirements, which may be modified by the Town of Arlington in a case-by-case situation to better suit the problems and specific needs of a particular site:

1. *All projects subject to this By-Law must meet the standards of the most current Massachusetts Department of Environmental Protection (DEP) Stormwater Management Policy and any applicable By-Laws and/or Rules and Regulations of the Town of Arlington.*

   The Project, as currently designed and demonstrated by this stormwater management plan and report, fully complies with the DEP Stormwater management Policy and Town of Arlington regulations.

2. *No project shall result in an increase in the peak rate of stormwater runoff or volume over natural and existing conditions for the 2-, 10-, and 25-Year 24-hour duration storm events.*

   Project complies, refer to Table 4.

3. Technical design and construction standards for detention/retention/infiltration structures, including, but not limited to, groundwater separation, outlet control structures, sediment forebays, spillways, splashpads, as well as sizing for any basins, outlets, and spillways shall be consistent with DEP Stormwater Management Standards.

   Project complies, refer to the Site Plans for the design and details for the stormwater management structures, which are consistent with the DEP Stormwater Management Standards.

4. *The design for the capacity of all stormwater system pipes and inlet grates shall be based on a Rational Method Analysis (or acceptable equivalent) for a 25-Year Storm intensity.*

   The closed drainage system has been designed to adequately convey the 25-year storm event. Refer to Appendix G for the hydraulic capacity spreadsheet for the pipe network.

5. *Existing lot grading shall be retained wherever possible to maintain predevelopment drainage patterns to the greatest extent possible. Where grading must be altered, the proposed grading shall not convey additional overland flows across lot lines or cause ponding on any adjacent property.*

   The project has been designed to mimic existing hydrologic drainage patterns. Stormwater management best management practices have been incorporated to provide water quality treatment and water quality control to ensure additional stormwater is not conveyed across lot lines or cause ponding on adjacent properties.

All projects to which the above referenced Town by-law applies, shall submit to the Engineering Division a Grading & Drainage Report and/or Plan at a minimum scale of 1"=40'. The Plans and/or Report shall consist of and include the following information (if applicable):

1. *The Name, Mailing Address, Phone Number, and Email of the Property Owner, Land Developer, and the Engineer or Consultant working on the Project.*
2. *Delineation of:*
   a. *Federal, State, and/or Local Wetlands.*
   b. *The National Flood Insurance Program 100-Year Flood Zone and/or other Risk Areas.*
   c. *Any Streams and/or Drainage Ways on or abutting the Site.*
   d. *Any Easements or Right-of-Ways on or abutting the Site.*
   e. *Extents of the Project or a Limit of Work/Disturbance Area.*

3. *Existing and proposed contours on the site to indicate general topography. The contour interval shall be at a two- foot interval. Spot elevations shall be included in areas with grades of 2% or less. If permanent benchmarks are required for the proposed activities, those shall also be shown on the Plan.*
   a. *Approximate existing contour lines that are appropriate for use in certain small-scale projects can be found on the Town of Arlington website at http://209.6.3.218/GISMaps//index1.htm.*
4. *Existing and proposed impervious surfaces shall be clearly delineated and labeled on the plan. Include a summary table of all features, both existing and proposed. An example summary table is shown below:*

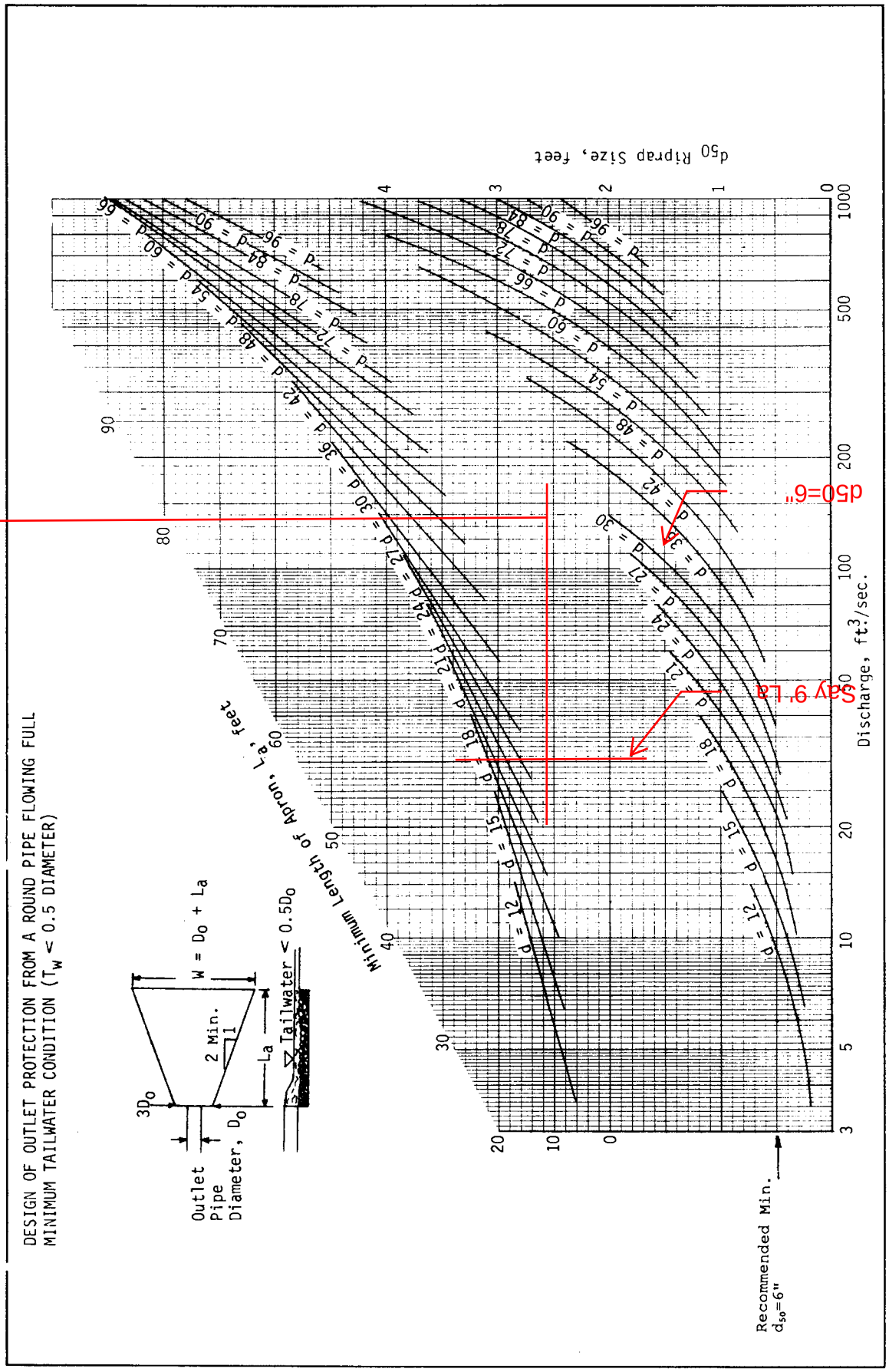
	Existing (SF)	***Proposed (SF)***	***Alteration***
Building Footprint	*1,250*	*1,500*	*+ 250 SF*
Bituminous Driveway	*500*	*650*	*+ 150 SF*
Concrete Walkway	*40*	*30*	*- 10 SF*
Total Impervious	***1,790***	***2,180***	***+ 390 SF***

5. *Existing and Proposed locations of all drainage structures, including foundation and roof drains, with rim and invert elevations. Profile and/or Cross Section drawings shall be provided for all proposed infiltration/retention/detention systems.*
6. *Where stormwater recharge or infiltration is proposed, the plans shall include observed and estimated maximum groundwater elevations at the location of each proposed infiltration/retention/detention area.*
   a. *Soil percolation testing or other acceptable soil absorption rate testing should be conducted in the vicinity of any proposed infiltration/retention/detention area.*
7. *Location and detail of proposed erosion & sediment control measures to be installed and maintained during construction activities.*
8. *Hydrologic calculations and a summary table showing the pre- and post-development runoff conditions for comparative purposes. Runoff calculations shall be prepared for the 2-, 10-, 25-, and 100-Year storm events for both the Existing and Proposed Conditions. These drainage calculations shall be prepared by utilizing the NRCS TR55 or TR20 Method.*
   a. *With a written request from the applicant, and at the full discretion of the Town of Arlington Engineering Division, certain small-scale projects may adequately demonstrate through simple runoff/storage calculations that the proposed stormwater mitigation is appropriate.*

9. The project has incorporated the requirements of the stormwater management plans and drainage report, as demonstrated by the technical analysis included in this report and Site Plans

Appendix A: Standard 1 Computations and Supporting Information

- Outlet Protection Sizing Calculation
- Pipe Sizing Calculations



Source: USDA-SCS Plate 3.18-3

Pipe Sizing Calculations

The closed drainage system was designed for the 25-year storm event, in accordance with the Town's by-laws.

Drainage pipes were sized using Manning's Equation for full-flow capacity and the Rational Method. Additionally, the performance of the system was analyzed using StormCAD, a HEC-22 based program.

Stormcad Conduit Output Table - Hydraulic Pipe Analysis

Project	Proposed Self Storage Facility	**Project #**	52816.00
	Arlington, MA		
Calculated by	MEA	**Date**	2/9/2022 Revised 4/21/2022
Checked by		**Date**	

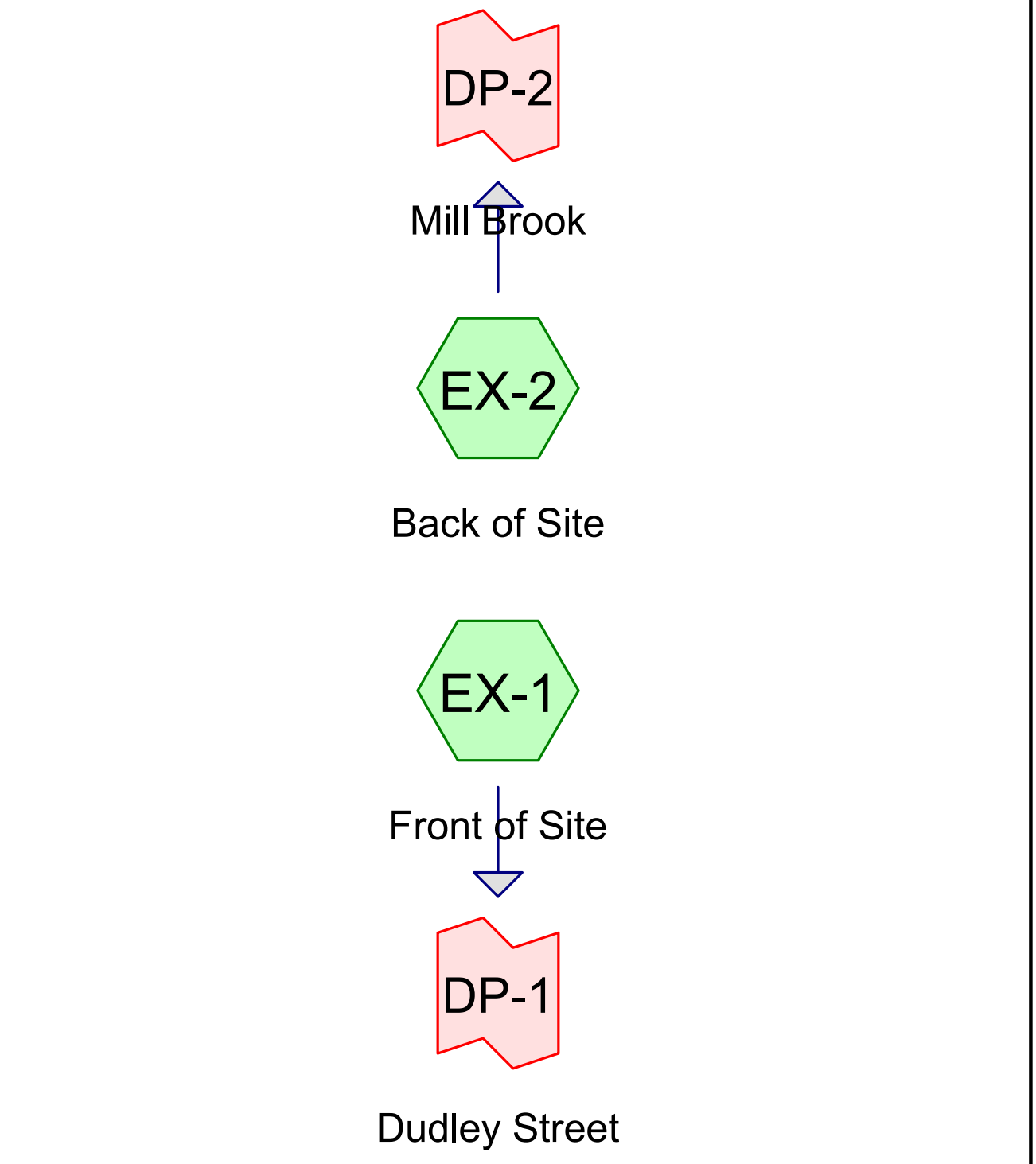
Start Node	Stop Node	Upstream Inlet Area	Upstream Inlet C	System CA	Time of Conc.	Intensity	Pipe Size	Material	Manning's "n"	Slope	Length	Capacity (Full Flow)	Flow (Design)	Velocity (Average)	Rim (Upper)	Hydraulic Grade Line In	Rim (Lower)	Hydraulic Grade Line Out	Invert (Upper)	Invert (Lower)
-	-	(acres)	-	(acres)	(min)	(in/hr)	(in)	-	-	(ft/ft)	(ft)	(cfs)	(cfs)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
101 (DRAIN)	Mill Brook	(N/A)	(N/A)	0.000	0.41	8.52	12	HDPE Pipe	0.013	0.015	13.6	4.32	1.30	4.81	78.01	71.48	0.00	71.19	71.00	70.80
100 (DRAIN)	113 (DRAIN)	(N/A)	(N/A)	0.000	0.04	8.52	12	HDPE Pipe	0.013	0.006	15.8	2.83	1.30	3.53	77.97	72.18	78.13	72.08	71.70	71.60
113 (DRAIN)	101 (DRAIN)	(N/A)	(N/A)	0.000	0.12	8.52	12	HDPE Pipe	0.013	0.006	62.9	2.84	1.30	3.54	78.13	71.98	78.01	71.57	71.50	71.10
107 (DRAIN)	SSIS 2	(N/A)	(N/A)	0.231	5.25	8.35	12	HDPE Pipe	0.013	0.012	10.3	3.98	1.95	5.04	78.12	70.50	74.95	70.38	69.90	69.85
MH-7	107 (DRAIN)	(N/A)	(N/A)	0.231	5.21	8.37	12	HDPE Pipe	0.013	0.014	14.5	4.18	1.95	5.23	76.05	75.60	78.12	75.30	75.00	74.80
STORMTECH	100 (DRAIN)	(N/A)	(N/A)	0.000	0.00	8.52	12	HDPE Pipe	0.013	0.012	12.6	3.98	1.30	1.66	70.90	72.19	77.97	72.18	69.85	69.80
104	102	0.006	0.9	0.005	5.00	8.47	12	HDPE Pipe	0.013	0.031	13.2	6.30	0.05	2.33	77.91	74.19	77.70	73.76	74.10	73.70
SSIS	102	(N/A)	(N/A)	0.267	5.23	8.36	12	HDPE Pipe	0.013	0.025	8.8	5.64	2.25	2.87	70.95	70.69	77.70	70.54	69.90	69.80
103	102	(N/A)	(N/A)	0.061	5.06	8.44	12	HDPE Pipe	0.013	0.021	36.1	5.20	0.52	4.23	77.25	70.68	77.70	70.69	70.20	70.00
BEND	102	(N/A)	(N/A)	0.201	5.18	8.38	12	HDPE Pipe	0.013	0.015	12.9	4.44	1.70	5.27	76.05	75.55	77.70	75.25	75.00	74.80
106	103	0.068	0.9	0.061	5.00	8.47	12	HDPE Pipe	0.013	0.031	16.0	6.31	0.52	4.86	76.25	72.30	77.25	71.70	72.00	71.50
RD-3	BEND	0.223	0.9	0.201	5.00	8.47	12	HDPE Pipe	0.013	0.017	60.0	4.60	1.71	5.43	77.05	76.56	76.05	75.42	76.00	75.00
RD-1	MH-7	0.061	0.9	0.055	5.00	8.47	12	HDPE Pipe	0.013	0.017	47.2	4.64	0.47	3.79	76.85	76.08	76.05	75.60	75.80	75.00
RD-2	MH-7	0.196	0.9	0.176	5.00	8.47	12	HDPE Pipe	0.013	0.060	10.0	8.70	1.51	8.31	76.25	75.72	76.05	75.60	75.20	75.00

Appendix B: Standard 2 Computations and Supporting Information

The rainfall-runoff response of the Site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2, 10, 25 and 100-years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm and NOAA Atlas 14+ precipitation depths for the site: 3.64, 5.79, 7.49, and 10.35 inches, respectively. Runoff coefficients for the pre- and post-development conditions, as previously shown in Tables 2 and 3 respectively, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. Drainage areas used in the analyses were described in previous sections and shown on Figures 2 and 3. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology.

HydroCAD Analysis: Existing Conditions

2-Year Storm Event – Existing



Routing Diagram for 52816.00 - Existing
Prepared by VHB, Printed 4/21/2022

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year+	Type III 24-hr		Default	24.00	1	3.64	2
2	10-year+	Type III 24-hr		Default	24.00	1	5.79	2
3	25-year+	Type III 24-hr		Default	24.00	1	7.49	2
4	100-year+	Type III 24-hr		Default	24.00	1	10.35	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.017	89	<50% Grass cover, Poor, HSG D (EX-1, EX-2)
0.003	80	>75% Grass cover, Good, HSG D (EX-1)
0.475	98	Paved parking, HSG D (EX-1, EX-2)
0.251	98	Roofs, HSG D (EX-1, EX-2)
0.038	79	Woods, Fair, HSG D (EX-2)
0.783	**97**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.783	HSG D	EX-1, EX-2
0.000	Other	
0.783		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.017	0.000	0.017	<50% Grass cover, Poor	EX-1, EX-2
0.000	0.000	0.000	0.003	0.000	0.003	>75% Grass cover, Good	EX-1
0.000	0.000	0.000	0.475	0.000	0.475	Paved parking	EX-1, EX-2
0.000	0.000	0.000	0.251	0.000	0.251	Roofs	EX-1, EX-2
0.000	0.000	0.000	0.038	0.000	0.038	Woods, Fair	EX-2
0.000	**0.000**	**0.000**	**0.783**	**0.000**	**0.783**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front of Site Runoff Area=0.324 ac 94.26% Impervious Runoff Depth=3.29"
Tc=5.0 min CN=97 Runoff=1.17 cfs 0.089 af

Subcatchment EX-2: Back of Site Runoff Area=0.459 ac 91.47% Impervious Runoff Depth=3.18"
Tc=5.0 min CN=96 Runoff=1.64 cfs 0.122 af

Link DP-1: Dudley Street Inflow=1.17 cfs 0.089 af
Primary=1.17 cfs 0.089 af

Link DP-2: Mill Brook Inflow=1.64 cfs 0.122 af
Primary=1.64 cfs 0.122 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.211 af Average Runoff Depth = 3.23"
7.37% Pervious = 0.058 ac 92.63% Impervious = 0.725 ac

Summary for Subcatchment EX-1: Front of Site

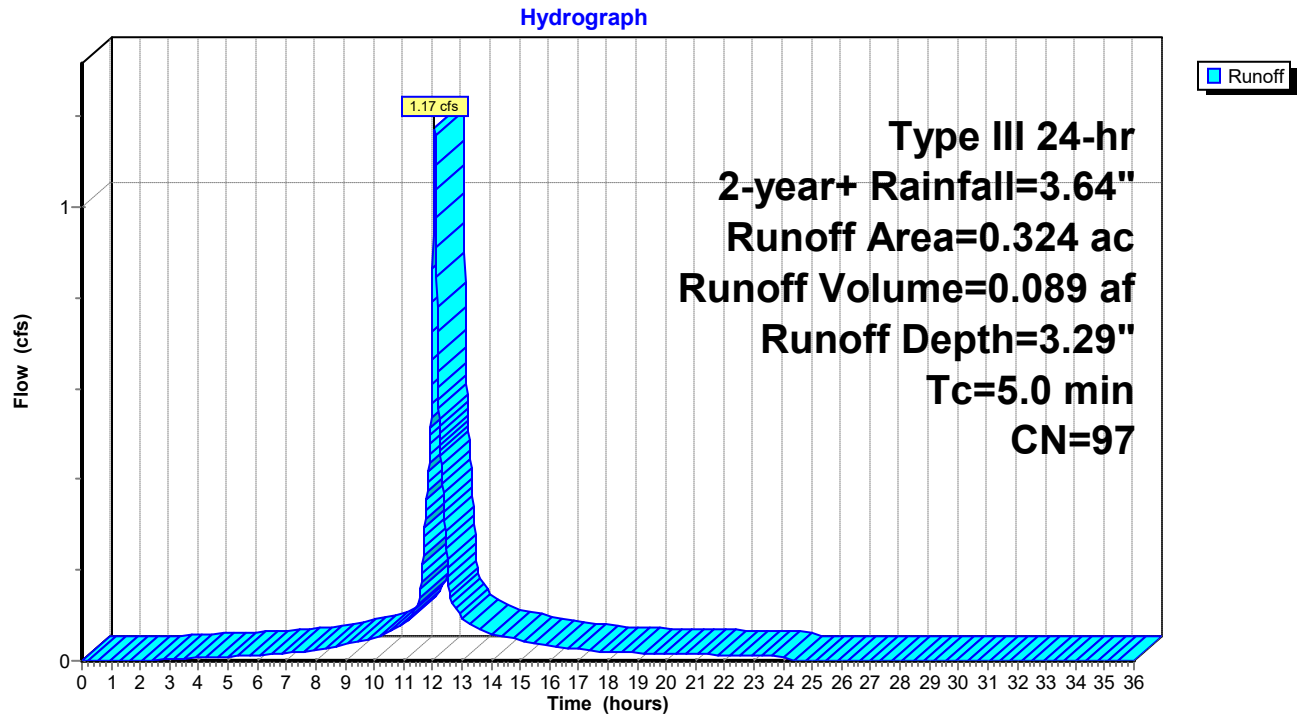
Runoff = 1.17 cfs @ 12.07 hrs, Volume= 0.089 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.016	89	<50% Grass cover, Poor, HSG D
0.003	80	>75% Grass cover, Good, HSG D
0.179	98	Paved parking, HSG D
0.127	98	Roofs, HSG D
0.324	97	Weighted Average
0.019		5.74% Pervious Area
0.305		94.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front of Site



Summary for Subcatchment EX-2: Back of Site

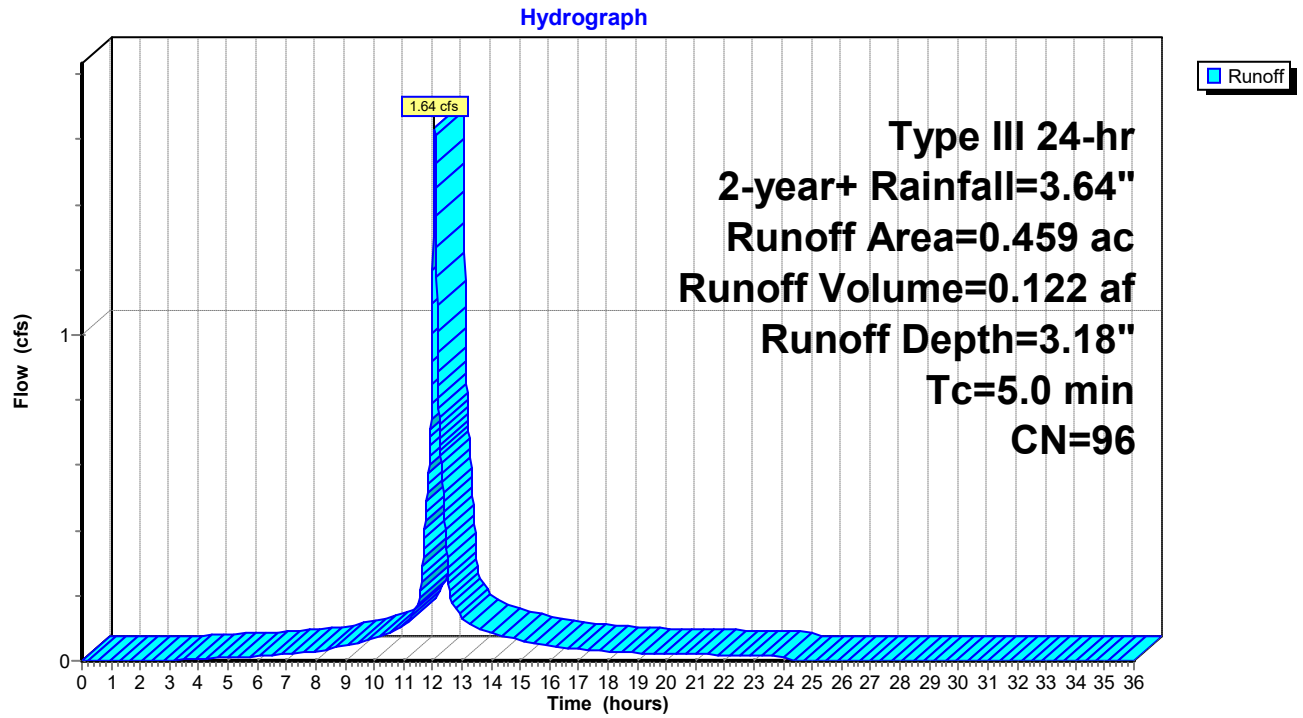
Runoff = 1.64 cfs @ 12.07 hrs, Volume= 0.122 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.001	89	<50% Grass cover, Poor, HSG D
0.296	98	Paved parking, HSG D
0.124	98	Roofs, HSG D
0.038	79	Woods, Fair, HSG D
0.459	96	Weighted Average
0.039		8.53% Pervious Area
0.420		91.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back of Site

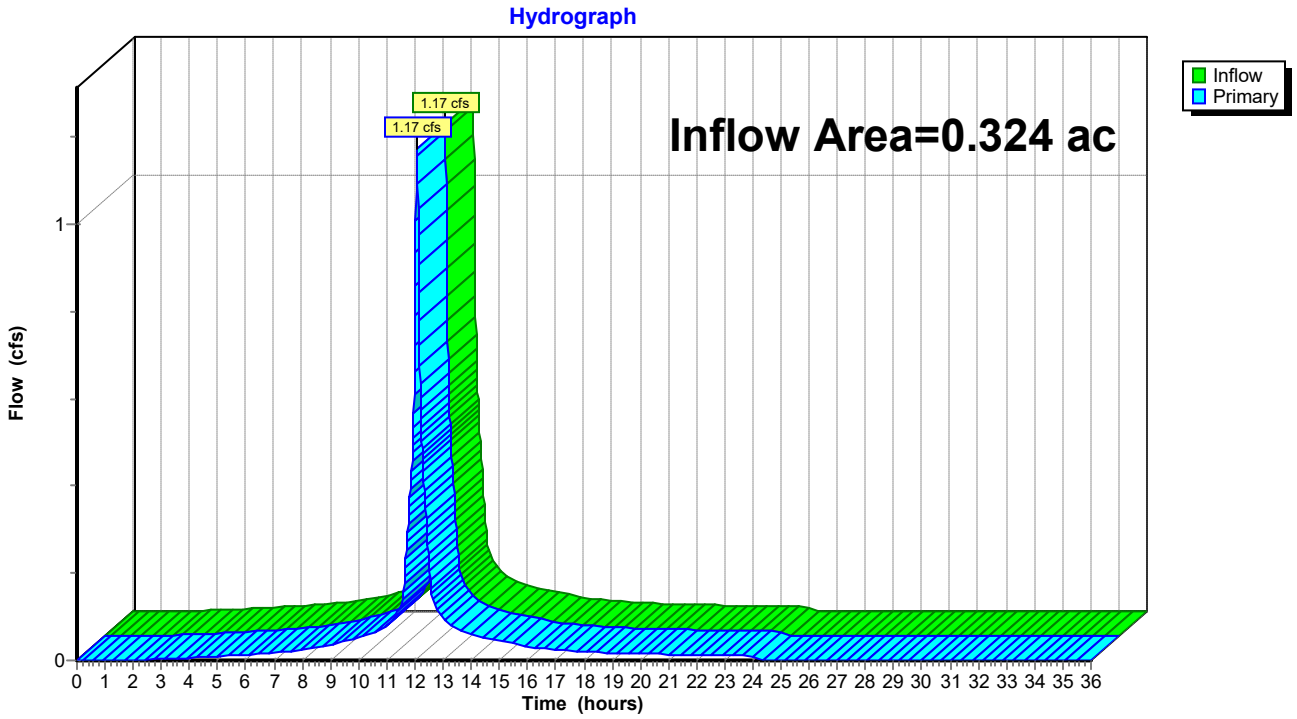


Summary for Link DP-1: Dudley Street

Inflow Area = 0.324 ac, 94.26% Impervious, Inflow Depth = 3.29" for 2-year+ event
Inflow = 1.17 cfs @ 12.07 hrs, Volume= 0.089 af
Primary = 1.17 cfs @ 12.07 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

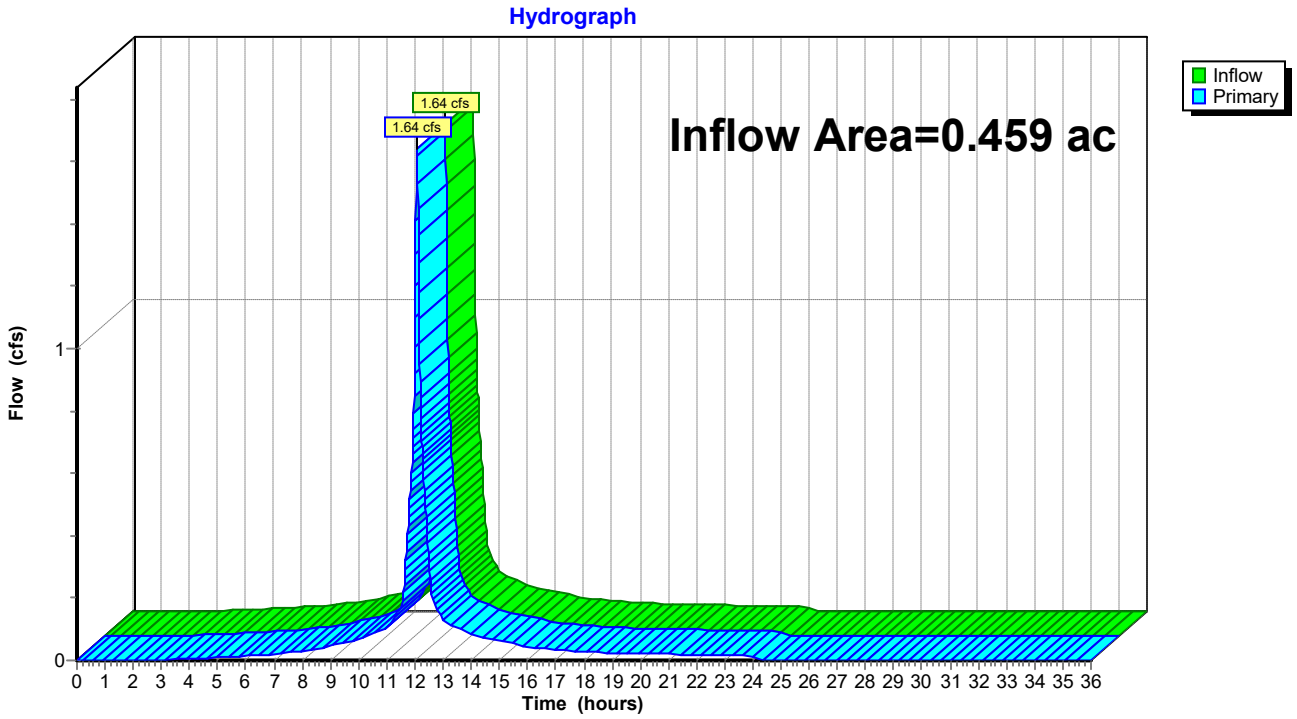


Summary for Link DP-2: Mill Brook

Inflow Area = 0.459 ac, 91.47% Impervious, Inflow Depth = 3.18" for 2-year+ event
Inflow = 1.64 cfs @ 12.07 hrs, Volume= 0.122 af
Primary = 1.64 cfs @ 12.07 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



10-Year Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front of Site Runoff Area=0.324 ac 94.26% Impervious Runoff Depth=5.43"
Tc=5.0 min CN=97 Runoff=1.89 cfs 0.147 af

Subcatchment EX-2: Back of Site Runoff Area=0.459 ac 91.47% Impervious Runoff Depth=5.32"
Tc=5.0 min CN=96 Runoff=2.66 cfs 0.203 af

Link DP-1: Dudley Street Inflow=1.89 cfs 0.147 af
Primary=1.89 cfs 0.147 af

Link DP-2: Mill Brook Inflow=2.66 cfs 0.203 af
Primary=2.66 cfs 0.203 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.350 af Average Runoff Depth = 5.37"
7.37% Pervious = 0.058 ac 92.63% Impervious = 0.725 ac

Summary for Subcatchment EX-1: Front of Site

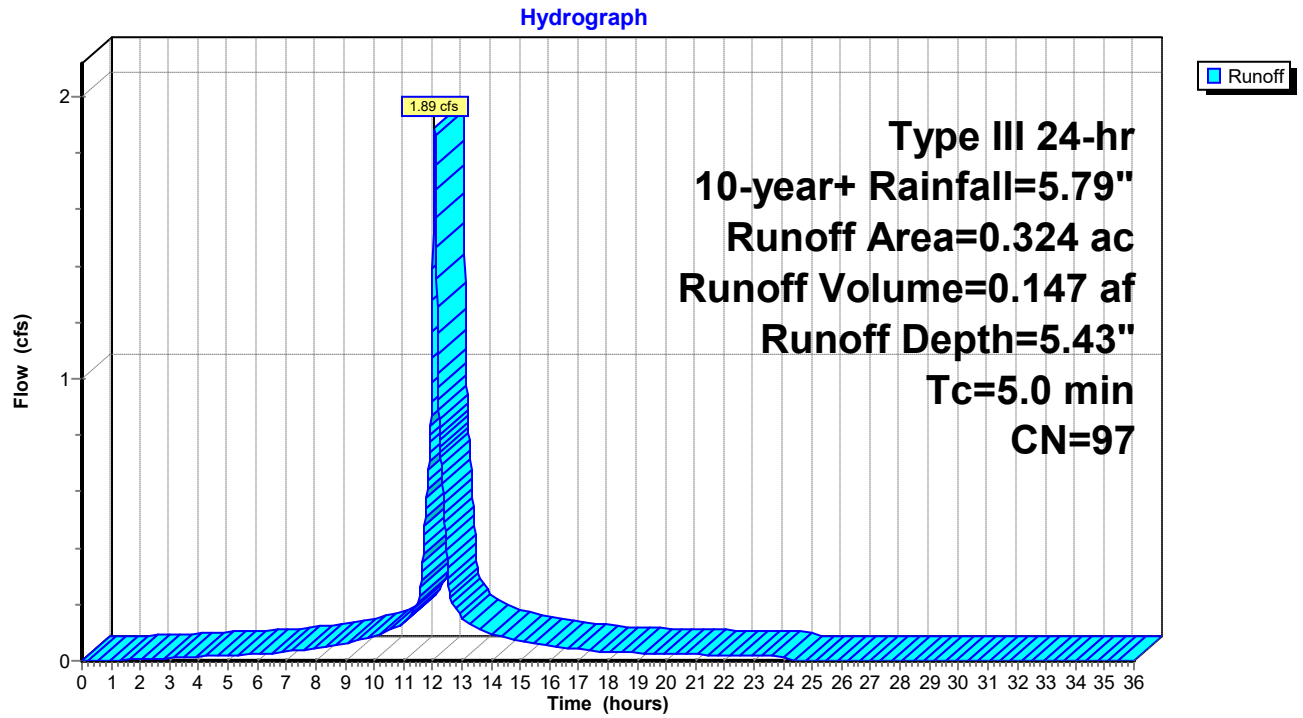
Runoff = 1.89 cfs @ 12.07 hrs, Volume= 0.147 af, Depth= 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.016	89	<50% Grass cover, Poor, HSG D
0.003	80	>75% Grass cover, Good, HSG D
0.179	98	Paved parking, HSG D
0.127	98	Roofs, HSG D
0.324	97	Weighted Average
0.019		5.74% Pervious Area
0.305		94.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front of Site



Summary for Subcatchment EX-2: Back of Site

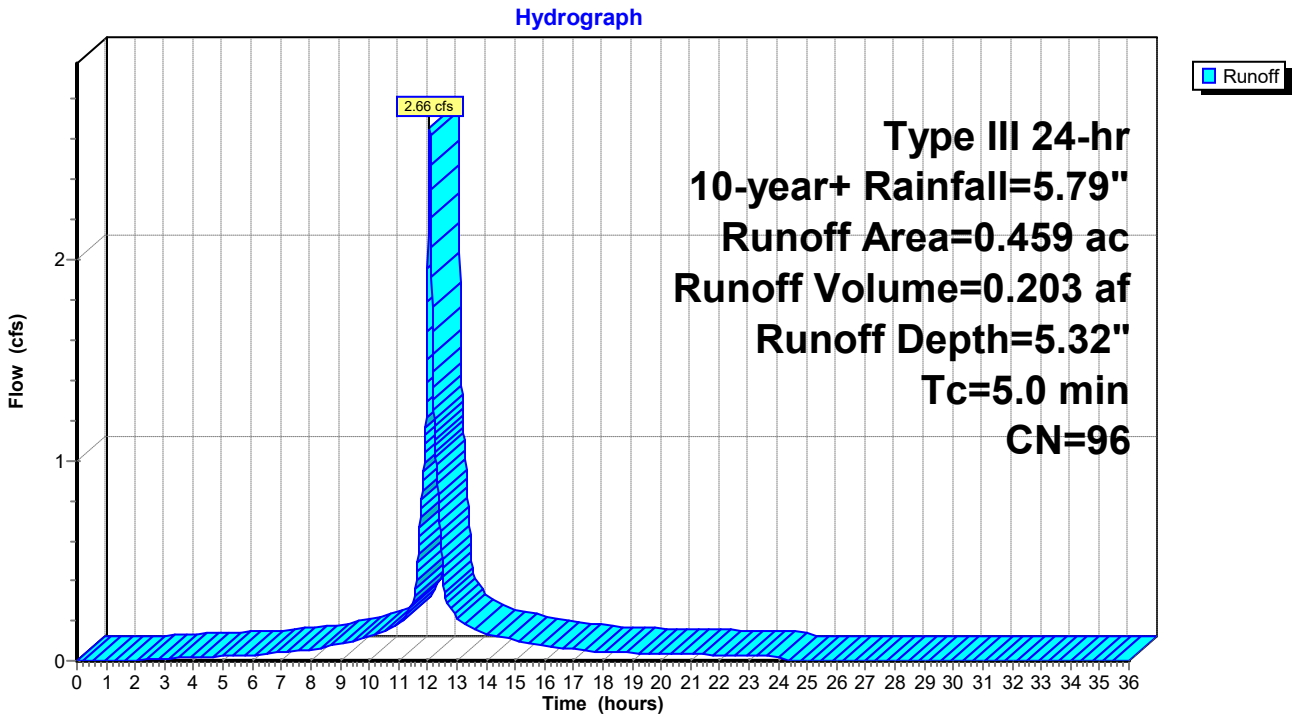
Runoff = 2.66 cfs @ 12.07 hrs, Volume= 0.203 af, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.001	89	<50% Grass cover, Poor, HSG D
0.296	98	Paved parking, HSG D
0.124	98	Roofs, HSG D
0.038	79	Woods, Fair, HSG D
0.459	96	Weighted Average
0.039		8.53% Pervious Area
0.420		91.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back of Site

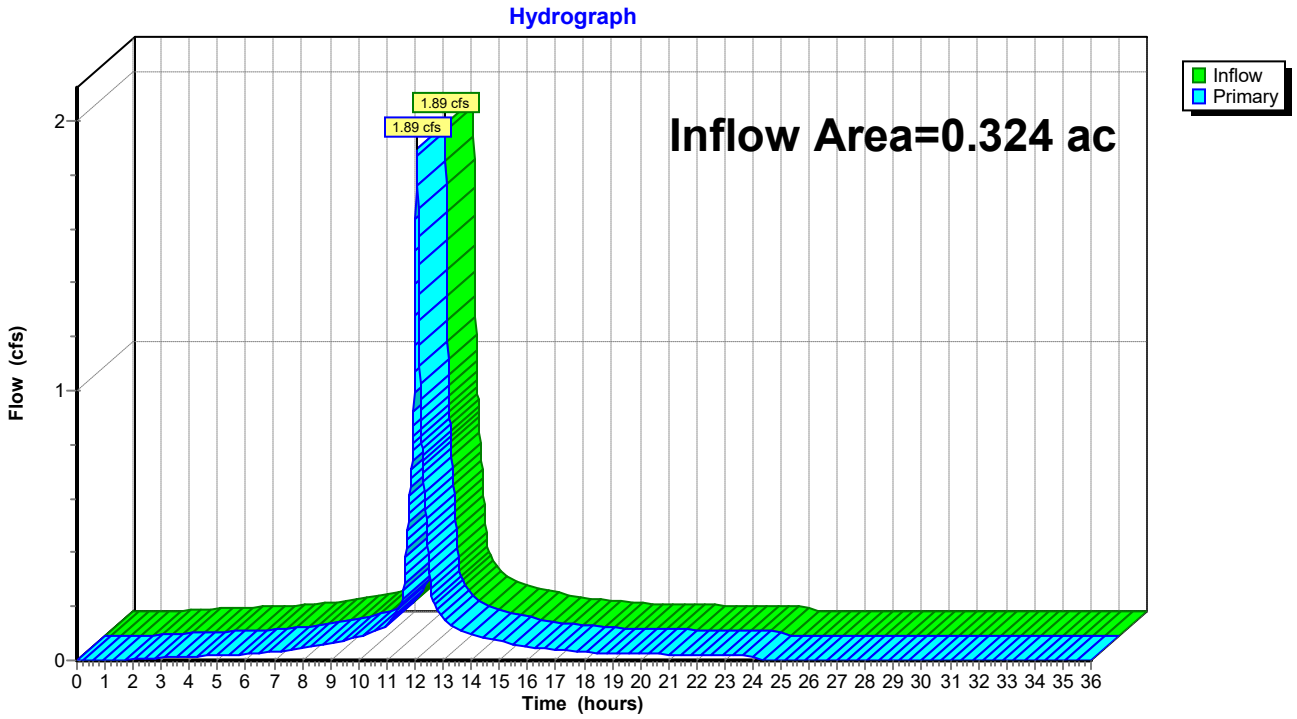


Summary for Link DP-1: Dudley Street

Inflow Area = 0.324 ac, 94.26% Impervious, Inflow Depth = 5.43" for 10-year+ event
Inflow = 1.89 cfs @ 12.07 hrs, Volume= 0.147 af
Primary = 1.89 cfs @ 12.07 hrs, Volume= 0.147 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

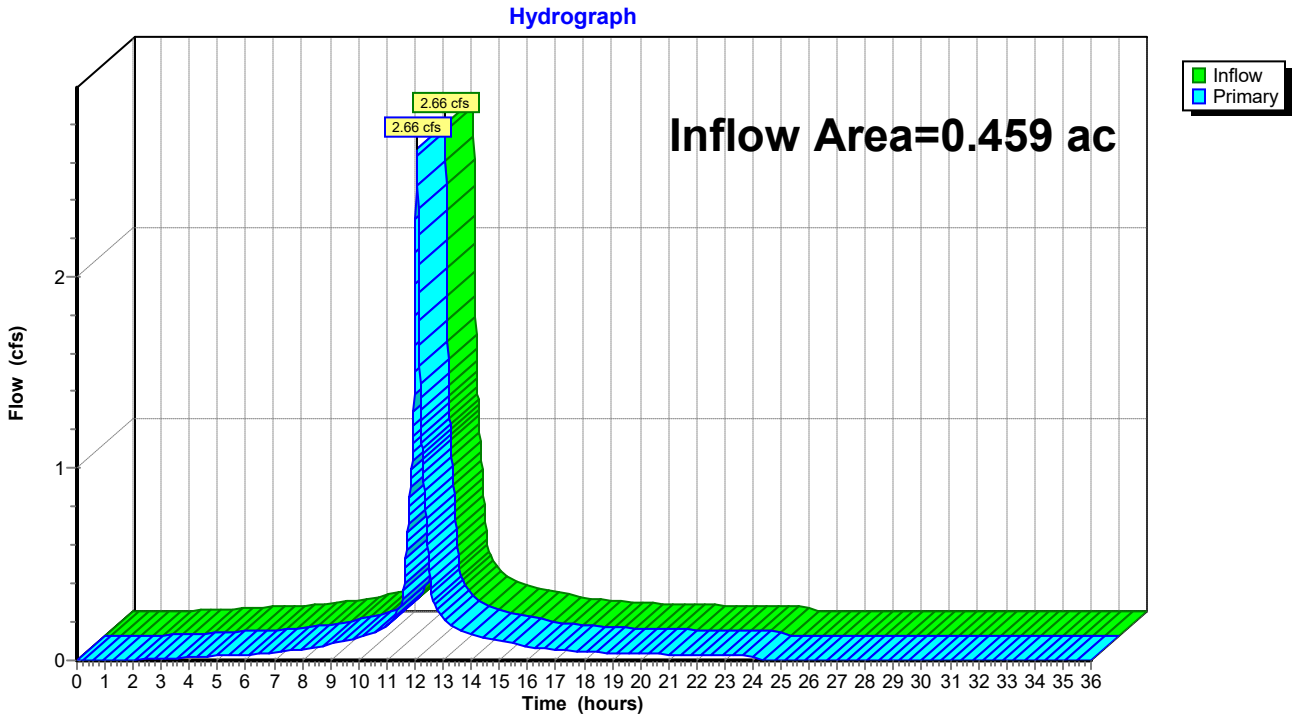


Summary for Link DP-2: Mill Brook

Inflow Area = 0.459 ac, 91.47% Impervious, Inflow Depth = 5.32" for 10-year+ event
Inflow = 2.66 cfs @ 12.07 hrs, Volume= 0.203 af
Primary = 2.66 cfs @ 12.07 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



25-Year Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front of Site Runoff Area=0.324 ac 94.26% Impervious Runoff Depth=7.13"
Tc=5.0 min CN=97 Runoff=2.46 cfs 0.192 af

Subcatchment EX-2: Back of Site Runoff Area=0.459 ac 91.47% Impervious Runoff Depth=7.01"
Tc=5.0 min CN=96 Runoff=3.47 cfs 0.268 af

Link DP-1: Dudley Street Inflow=2.46 cfs 0.192 af
Primary=2.46 cfs 0.192 af

Link DP-2: Mill Brook Inflow=3.47 cfs 0.268 af
Primary=3.47 cfs 0.268 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.461 af Average Runoff Depth = 7.06"
7.37% Pervious = 0.058 ac 92.63% Impervious = 0.725 ac

Summary for Subcatchment EX-1: Front of Site

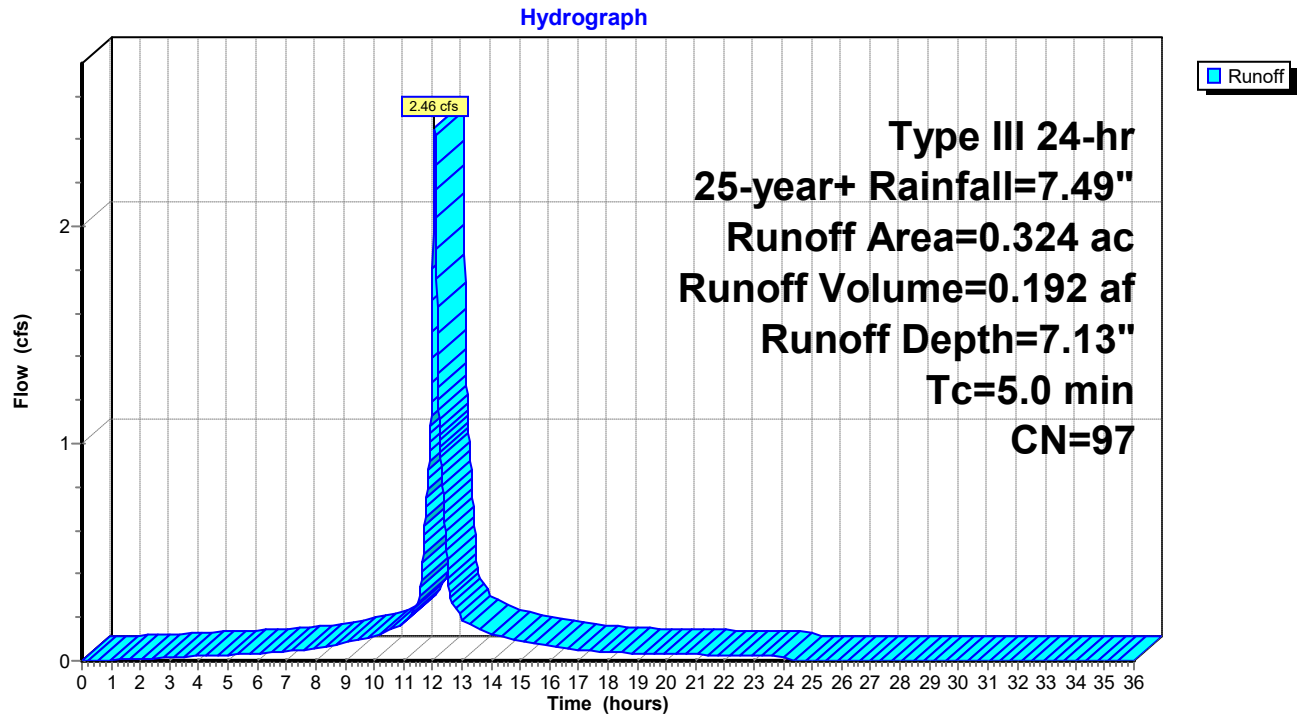
Runoff = 2.46 cfs @ 12.07 hrs, Volume= 0.192 af, Depth= 7.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.016	89	<50% Grass cover, Poor, HSG D
0.003	80	>75% Grass cover, Good, HSG D
0.179	98	Paved parking, HSG D
0.127	98	Roofs, HSG D
0.324	97	Weighted Average
0.019		5.74% Pervious Area
0.305		94.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front of Site



Summary for Subcatchment EX-2: Back of Site

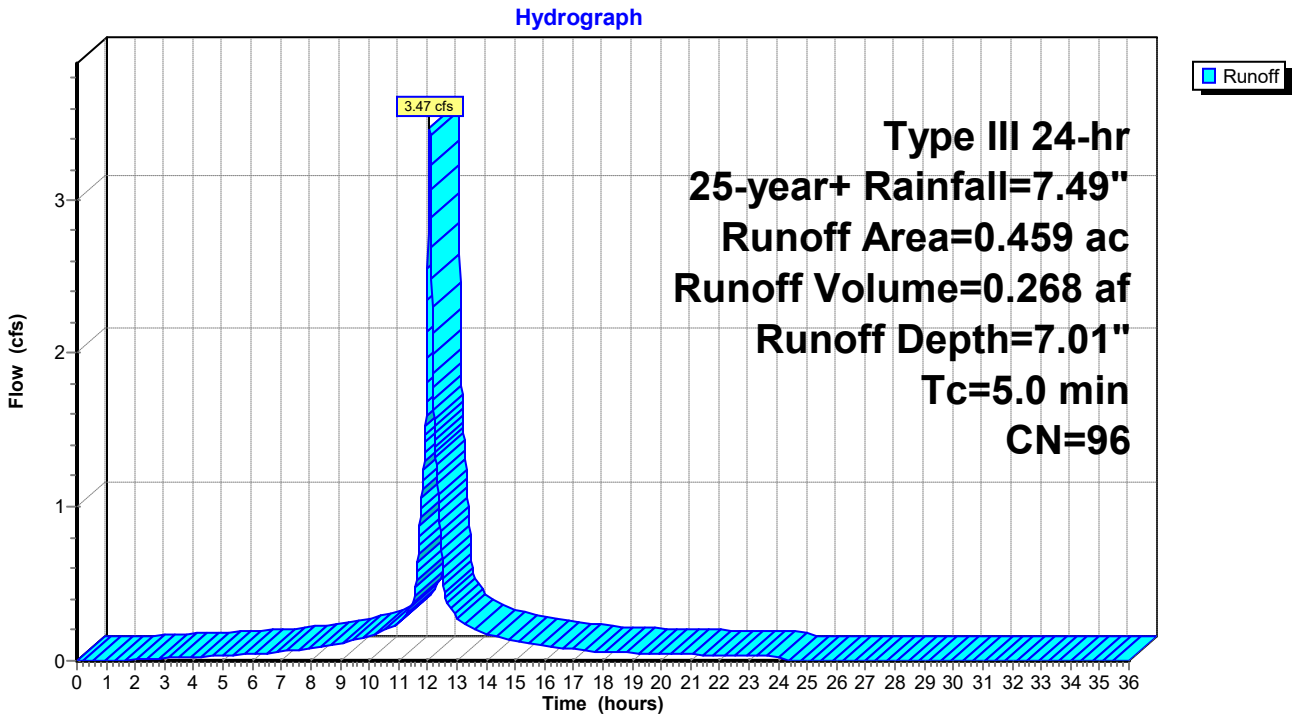
Runoff = 3.47 cfs @ 12.07 hrs, Volume= 0.268 af, Depth= 7.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.001	89	<50% Grass cover, Poor, HSG D
0.296	98	Paved parking, HSG D
0.124	98	Roofs, HSG D
0.038	79	Woods, Fair, HSG D
0.459	96	Weighted Average
0.039		8.53% Pervious Area
0.420		91.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back of Site

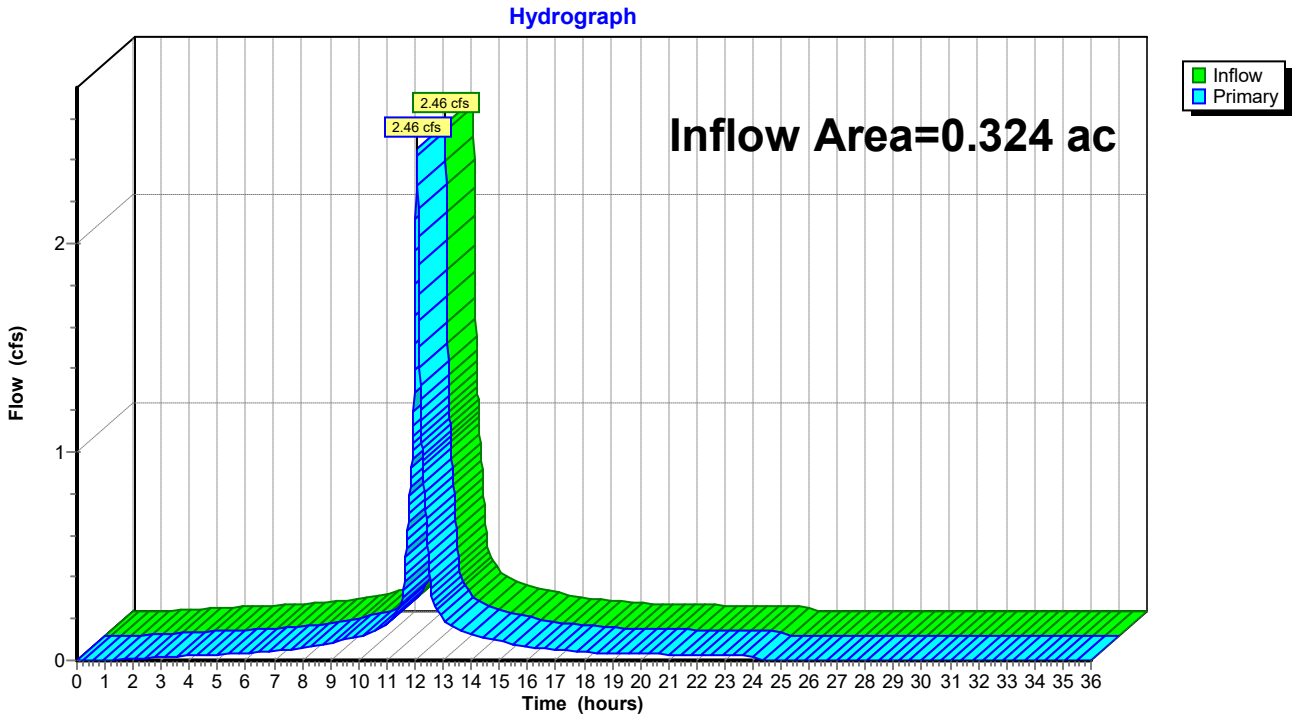


Summary for Link DP-1: Dudley Street

Inflow Area = 0.324 ac, 94.26% Impervious, Inflow Depth = 7.13" for 25-year+ event
Inflow = 2.46 cfs @ 12.07 hrs, Volume= 0.192 af
Primary = 2.46 cfs @ 12.07 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

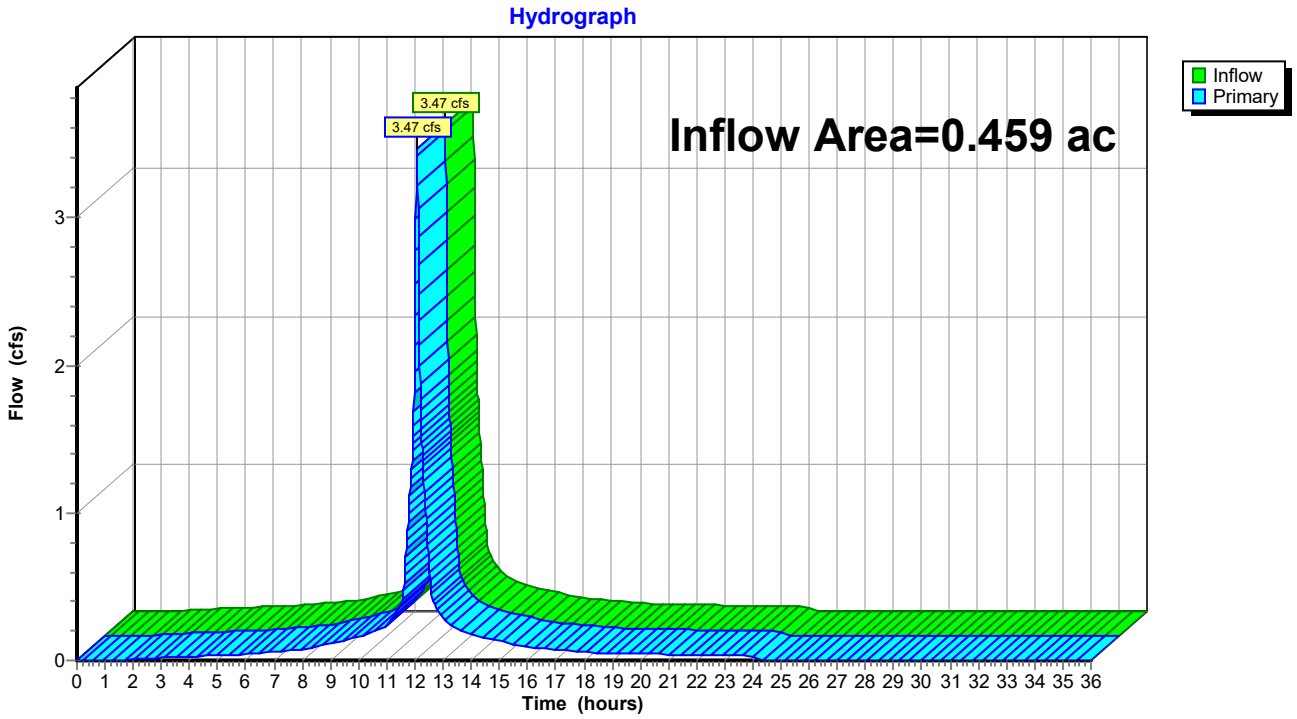


Summary for Link DP-2: Mill Brook

Inflow Area = 0.459 ac, 91.47% Impervious, Inflow Depth = 7.01" for 25-year+ event
Inflow = 3.47 cfs @ 12.07 hrs, Volume= 0.268 af
Primary = 3.47 cfs @ 12.07 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



100-Year Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front of Site Runoff Area=0.324 ac 94.26% Impervious Runoff Depth=9.99"
Tc=5.0 min CN=97 Runoff=3.41 cfs 0.270 af

Subcatchment EX-2: Back of Site Runoff Area=0.459 ac 91.47% Impervious Runoff Depth=9.87"
Tc=5.0 min CN=96 Runoff=4.82 cfs 0.377 af

Link DP-1: Dudley Street Inflow=3.41 cfs 0.270 af
Primary=3.41 cfs 0.270 af

Link DP-2: Mill Brook Inflow=4.82 cfs 0.377 af
Primary=4.82 cfs 0.377 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.647 af Average Runoff Depth = 9.92"
7.37% Pervious = 0.058 ac 92.63% Impervious = 0.725 ac

Summary for Subcatchment EX-1: Front of Site

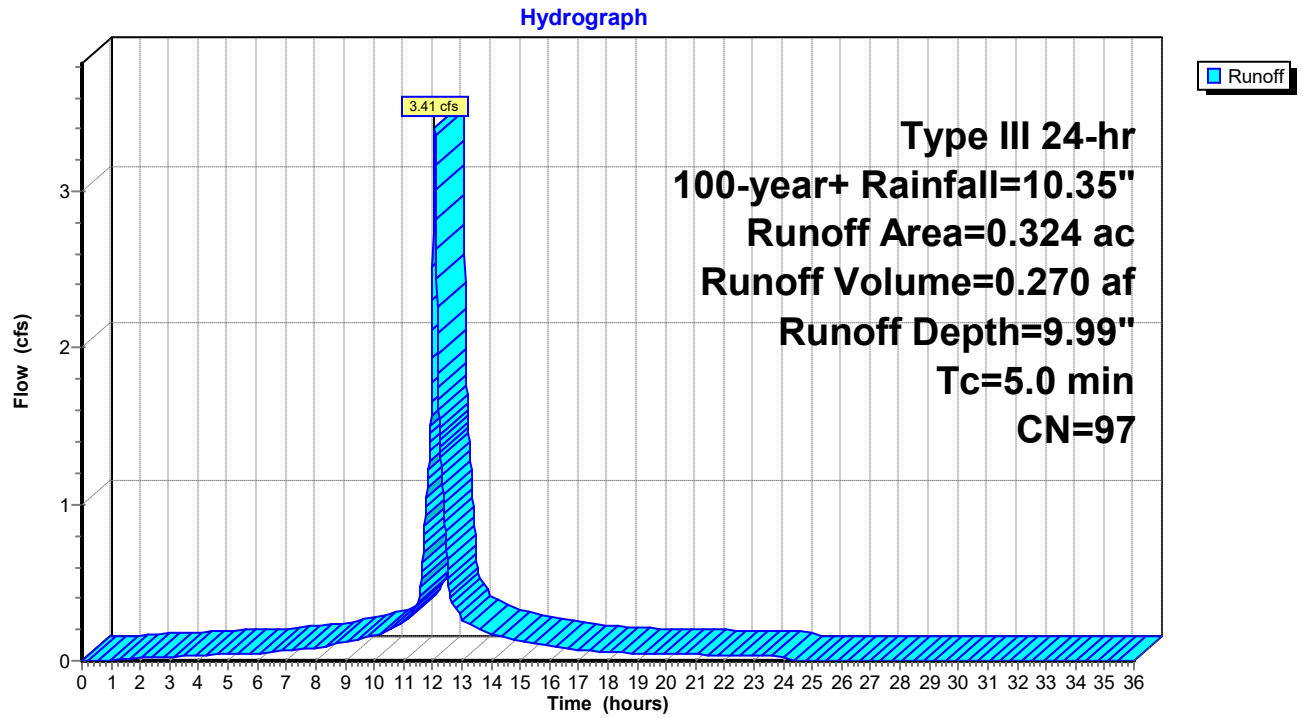
Runoff = 3.41 cfs @ 12.07 hrs, Volume= 0.270 af, Depth= 9.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.016	89	<50% Grass cover, Poor, HSG D
0.003	80	>75% Grass cover, Good, HSG D
0.179	98	Paved parking, HSG D
0.127	98	Roofs, HSG D
0.324	97	Weighted Average
0.019		5.74% Pervious Area
0.305		94.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front of Site



Summary for Subcatchment EX-2: Back of Site

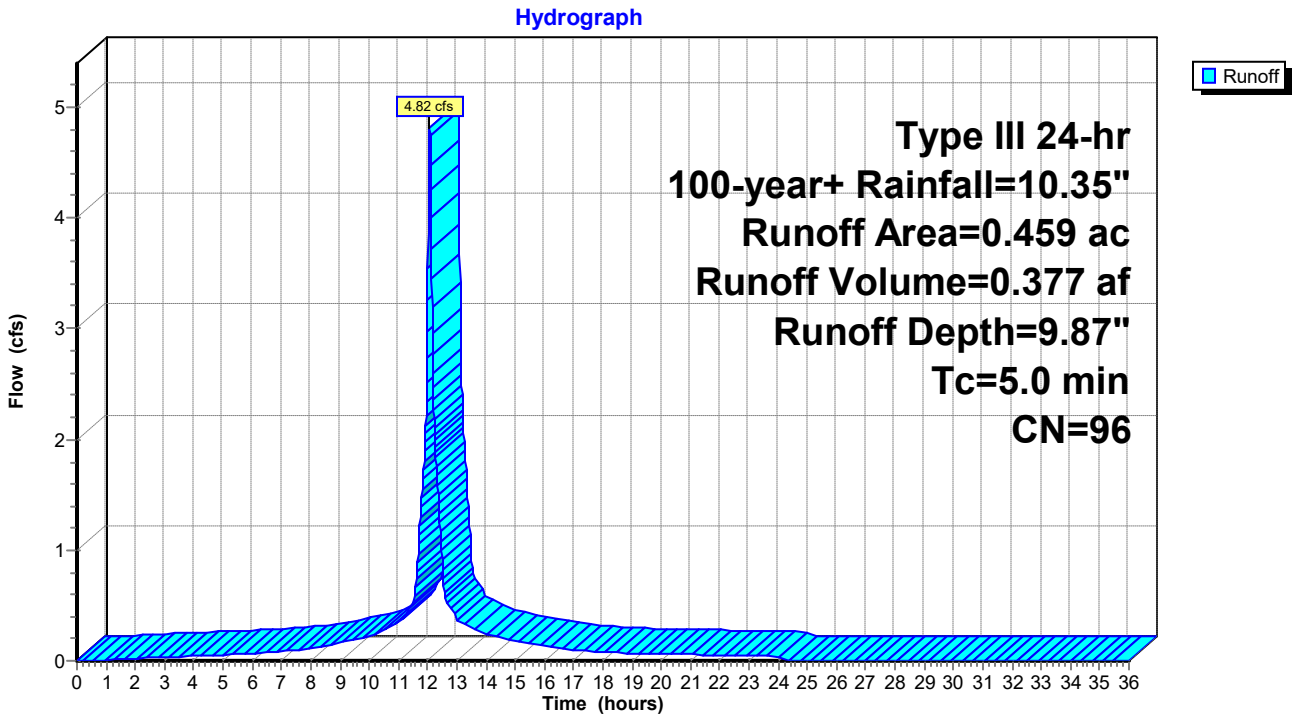
Runoff = 4.82 cfs @ 12.07 hrs, Volume= 0.377 af, Depth= 9.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.001	89	<50% Grass cover, Poor, HSG D
0.296	98	Paved parking, HSG D
0.124	98	Roofs, HSG D
0.038	79	Woods, Fair, HSG D
0.459	96	Weighted Average
0.039		8.53% Pervious Area
0.420		91.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back of Site

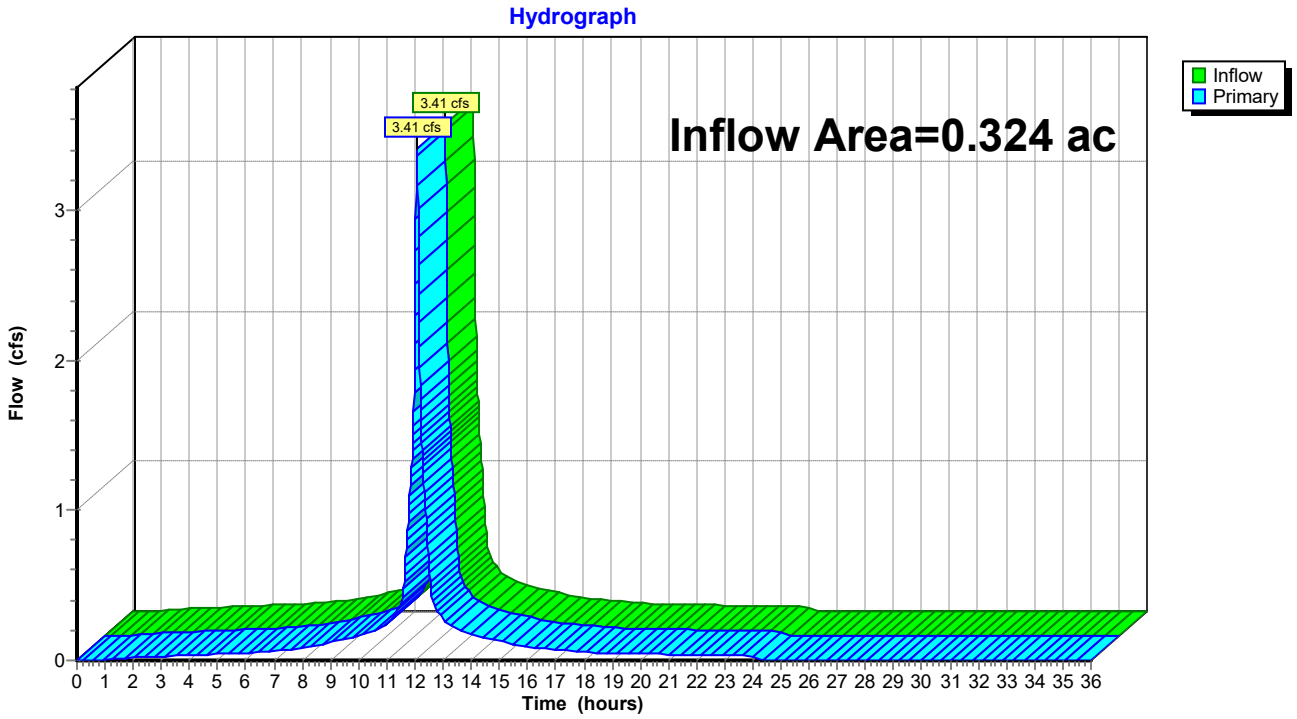


Summary for Link DP-1: Dudley Street

Inflow Area = 0.324 ac, 94.26% Impervious, Inflow Depth = 9.99" for 100-year+ event
Inflow = 3.41 cfs @ 12.07 hrs, Volume= 0.270 af
Primary = 3.41 cfs @ 12.07 hrs, Volume= 0.270 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

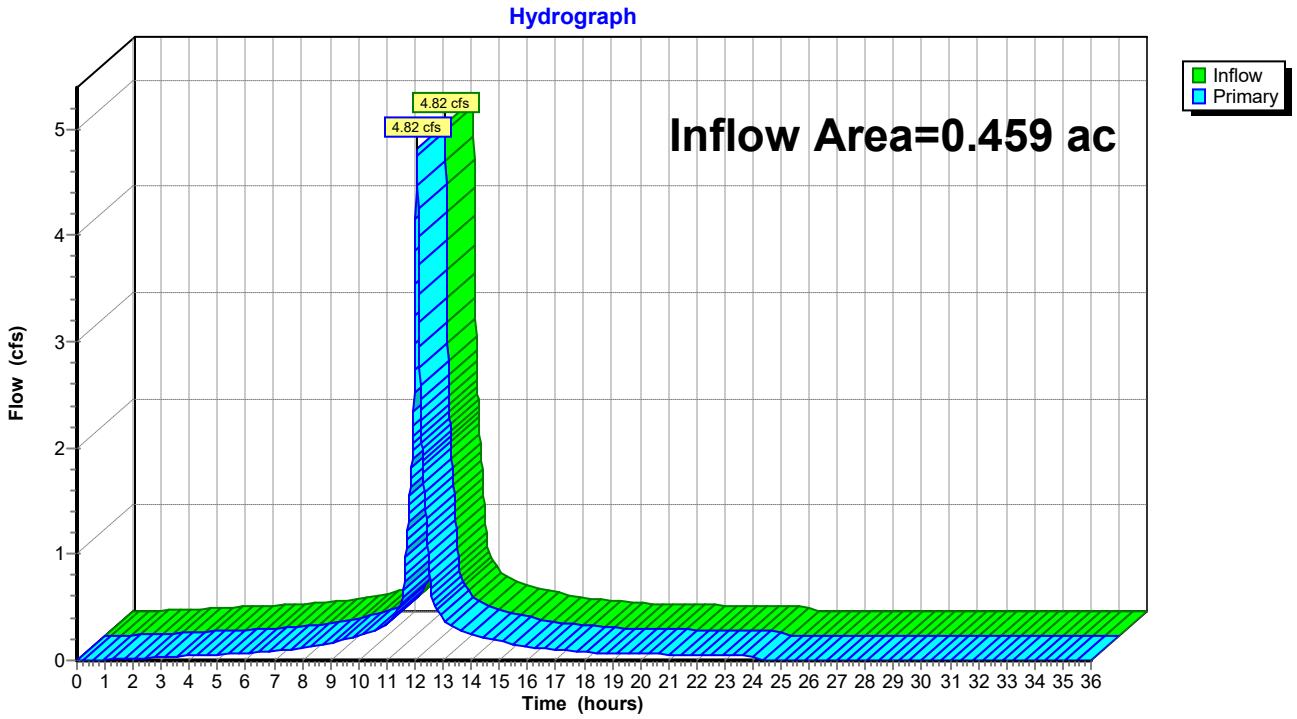


Summary for Link DP-2: Mill Brook

Inflow Area = 0.459 ac, 91.47% Impervious, Inflow Depth = 9.87" for 100-year+ event
Inflow = 4.82 cfs @ 12.07 hrs, Volume= 0.377 af
Primary = 4.82 cfs @ 12.07 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min

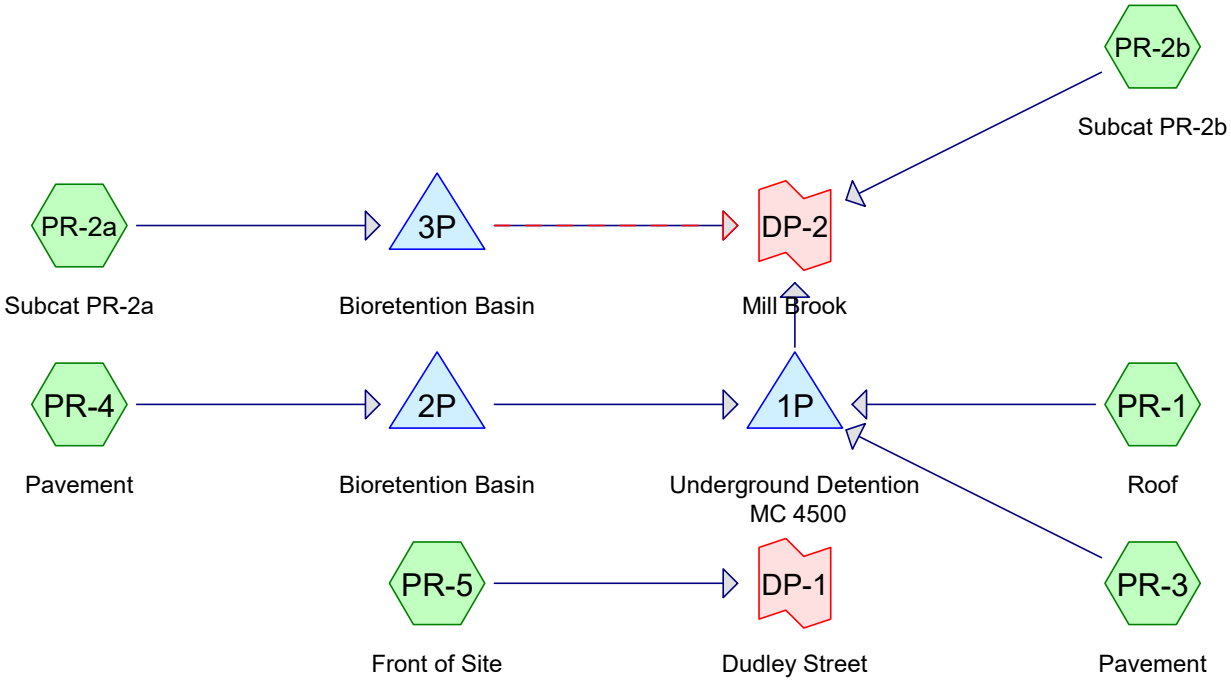
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



HydroCAD Analysis: Proposed Conditions

2-Year Storm Event – Proposed



Subcat Reach Pond Link

Routing Diagram for 52816.00 - Proposed
Prepared by VHB, Printed 4/21/2022

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year+	Type III 24-hr		Default	24.00	1	3.64	2
2	10-year+	Type III 24-hr		Default	24.00	1	5.79	2
3	25-year+	Type III 24-hr		Default	24.00	1	7.49	2
4	100-year+	Type III 24-hr		Default	24.00	1	10.35	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.212	80	>75% Grass cover, Good, HSG D (PR-2a, PR-2b, PR-5)
0.090	98	Paved parking, HSG D (PR-2b, PR-3, PR-4, PR-5)
0.480	98	Roofs, HSG D (PR-1)
0.783	**93**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.783	HSG D	PR-1, PR-2a, PR-2b, PR-3, PR-4, PR-5
0.000	Other	
0.783		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.212	0.000	0.212	>75% Grass cover, Good	PR-2a, PR-2b, PR-5
0.000	0.000	0.000	0.090	0.000	0.090	Paved parking	PR-2b, PR-3, PR-4, PR-5
0.000	0.000	0.000	0.480	0.000	0.480	Roofs	PR-1
0.000	**0.000**	**0.000**	**0.783**	**0.000**	**0.783**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	71.70	71.60	15.8	0.0063	0.013	0.0	12.0	0.0
2	2P	72.00	71.50	15.9	0.0314	0.013	0.0	12.0	0.0
3	3P	72.00	71.50	15.9	0.0314	0.013	0.0	12.0	0.0

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Roof Runoff Area=0.480 ac 100.00% Impervious Runoff Depth=3.41"
Tc=5.0 min CN=98 Runoff=1.76 cfs 0.136 af

Subcatchment PR-2a: Subcat PR-2a Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=1.75"
Tc=5.0 min CN=80 Runoff=0.18 cfs 0.012 af

Subcatchment PR-2b: Subcat PR-2b Runoff Area=0.105 ac 1.89% Impervious Runoff Depth=1.75"
Tc=5.0 min CN=80 Runoff=0.22 cfs 0.015 af

Subcatchment PR-3: Pavement Runoff Area=0.006 ac 100.00% Impervious Runoff Depth=3.41"
Tc=5.0 min CN=98 Runoff=0.02 cfs 0.002 af

Subcatchment PR-4: Pavement Runoff Area=0.068 ac 100.00% Impervious Runoff Depth=3.41"
Tc=5.0 min CN=98 Runoff=0.25 cfs 0.019 af

Subcatchment PR-5: Front of Site Runoff Area=0.040 ac 36.28% Impervious Runoff Depth=2.31"
Tc=5.0 min CN=87 Runoff=0.11 cfs 0.008 af

Pond 1P: Underground Detention MC 4500 Peak Elev=72.10' Storage=2,557 cf Inflow=2.01 cfs 0.147 af
Discarded=0.07 cfs 0.122 af Primary=0.40 cfs 0.025 af Outflow=0.48 cfs 0.147 af

Pond 2P: Bioretention Basin Peak Elev=76.33' Storage=82 cf Inflow=0.25 cfs 0.019 af
Discarded=0.01 cfs 0.010 af Primary=0.23 cfs 0.009 af Outflow=0.24 cfs 0.019 af

Pond 3P: Bioretention Basin Peak Elev=77.74' Storage=23 cf Inflow=0.18 cfs 0.012 af
Discarded=0.01 cfs 0.005 af Primary=0.16 cfs 0.007 af Secondary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.012 af

Link DP-1: Dudley Street Inflow=0.11 cfs 0.008 af
Primary=0.11 cfs 0.008 af

Link DP-2: Mill Brook Inflow=0.53 cfs 0.047 af
Primary=0.53 cfs 0.047 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.192 af Average Runoff Depth = 2.95"
27.13% Pervious = 0.212 ac 72.87% Impervious = 0.571 ac

Summary for Subcatchment PR-1: Roof

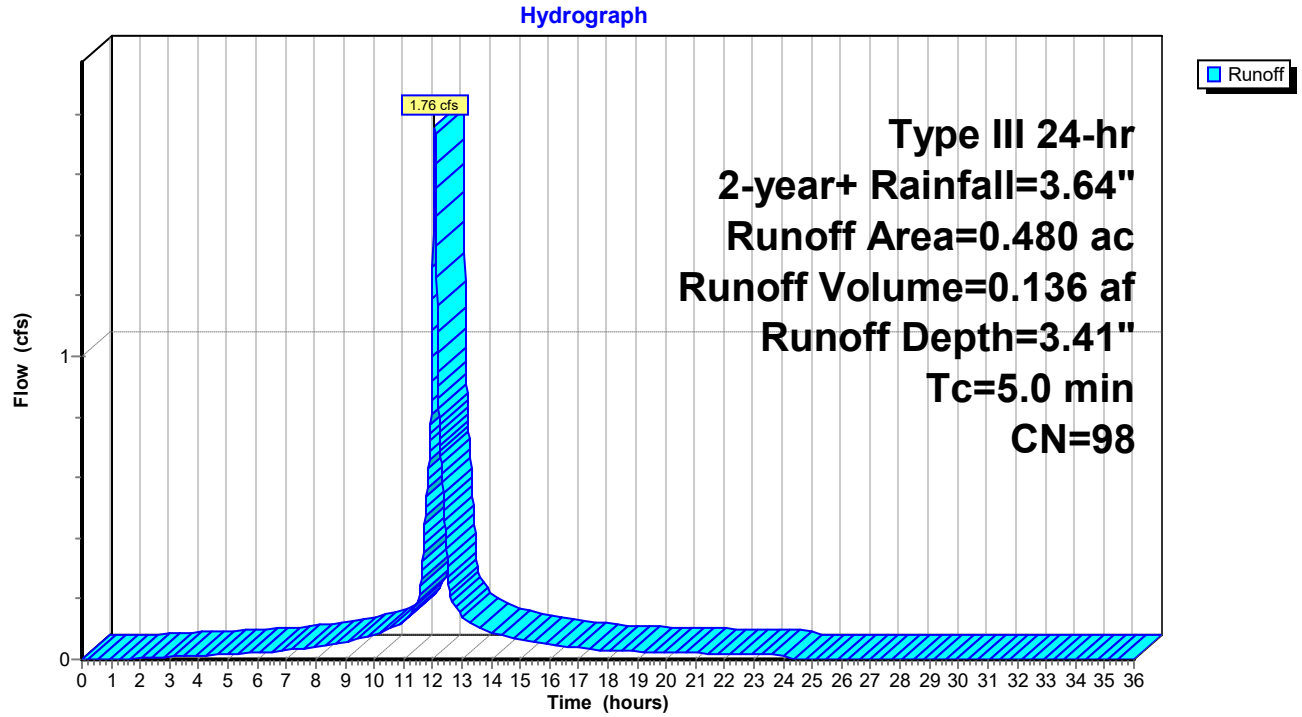
Runoff = 1.76 cfs @ 12.07 hrs, Volume= 0.136 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-1: Roof



Summary for Subcatchment PR-2a: Subcat PR-2a

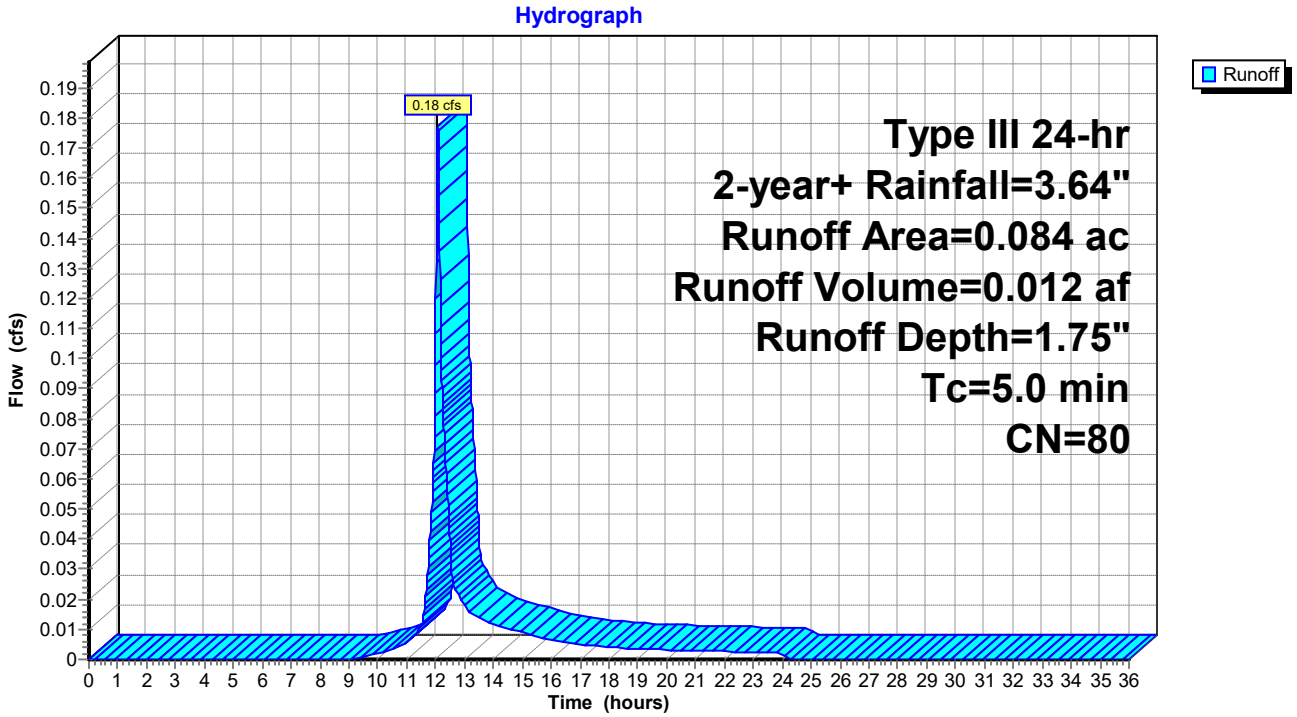
Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.084	80	>75% Grass cover, Good, HSG D
0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2a: Subcat PR-2a



Summary for Subcatchment PR-2b: Subcat PR-2b

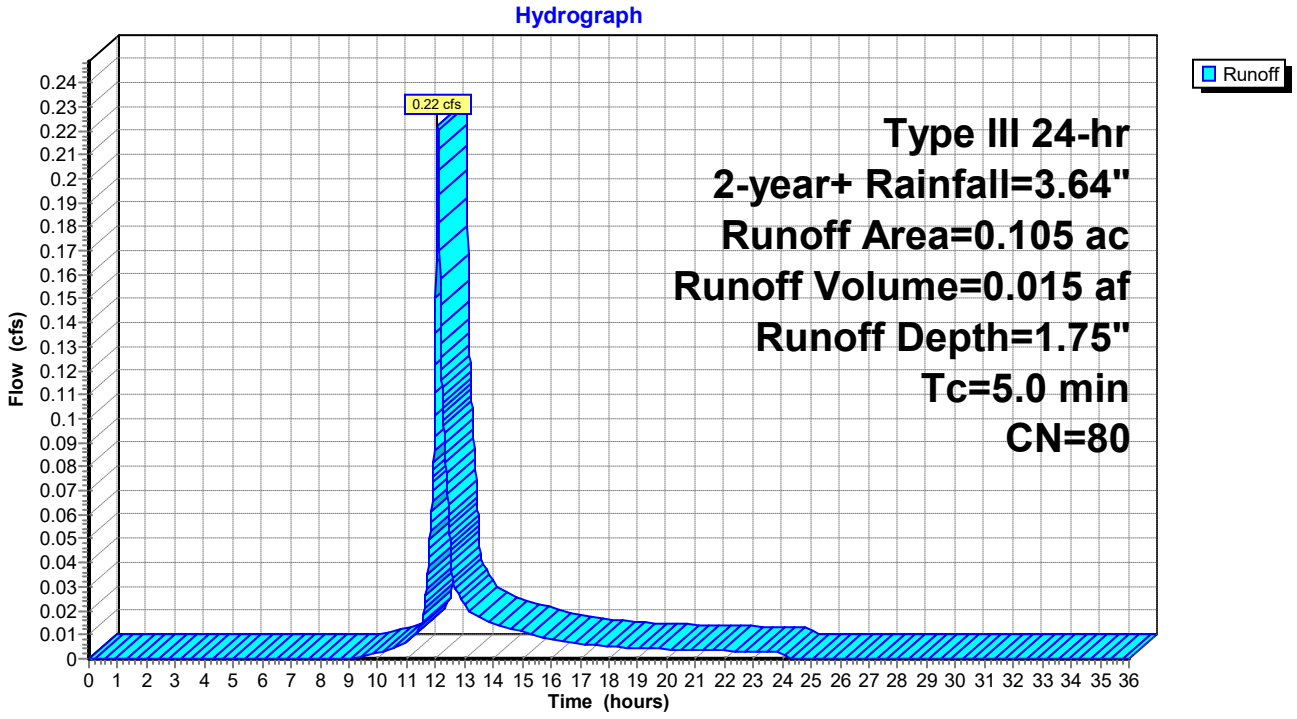
Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.015 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.103	80	>75% Grass cover, Good, HSG D
0.002	98	Paved parking, HSG D
0.105	80	Weighted Average
0.103		98.11% Pervious Area
0.002		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2b: Subcat PR-2b



Summary for Subcatchment PR-3: Pavement

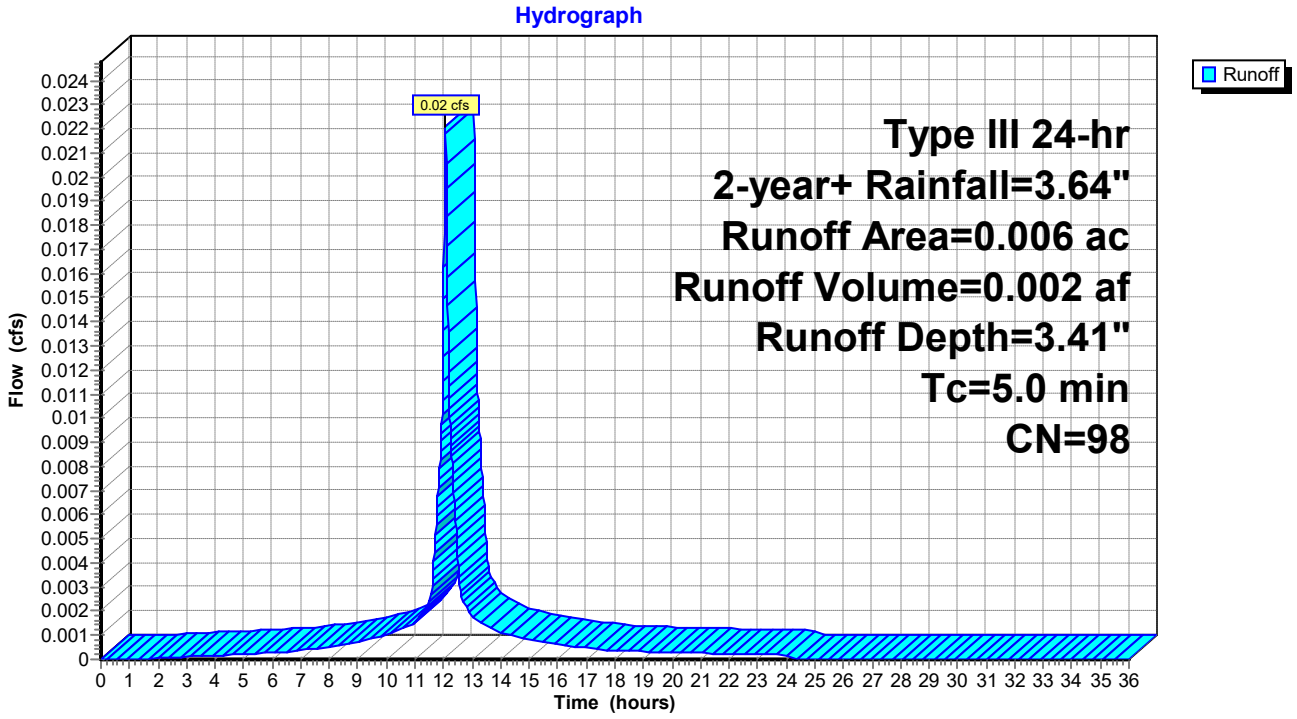
Runoff = 0.02 cfs @ 12.07 hrs, Volume= 0.002 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG D
0.006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-3: Pavement



Summary for Subcatchment PR-4: Pavement

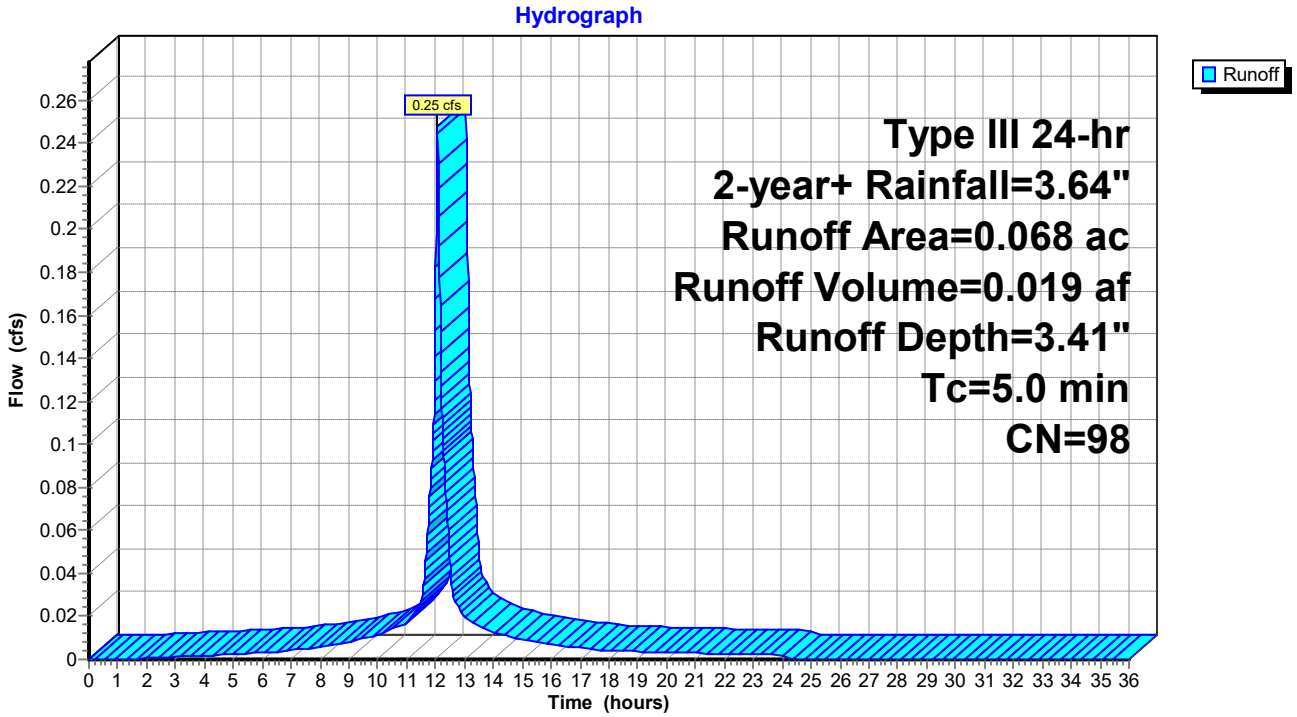
Runoff = 0.25 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG D
0.068		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-4: Pavement



Summary for Subcatchment PR-5: Front of Site

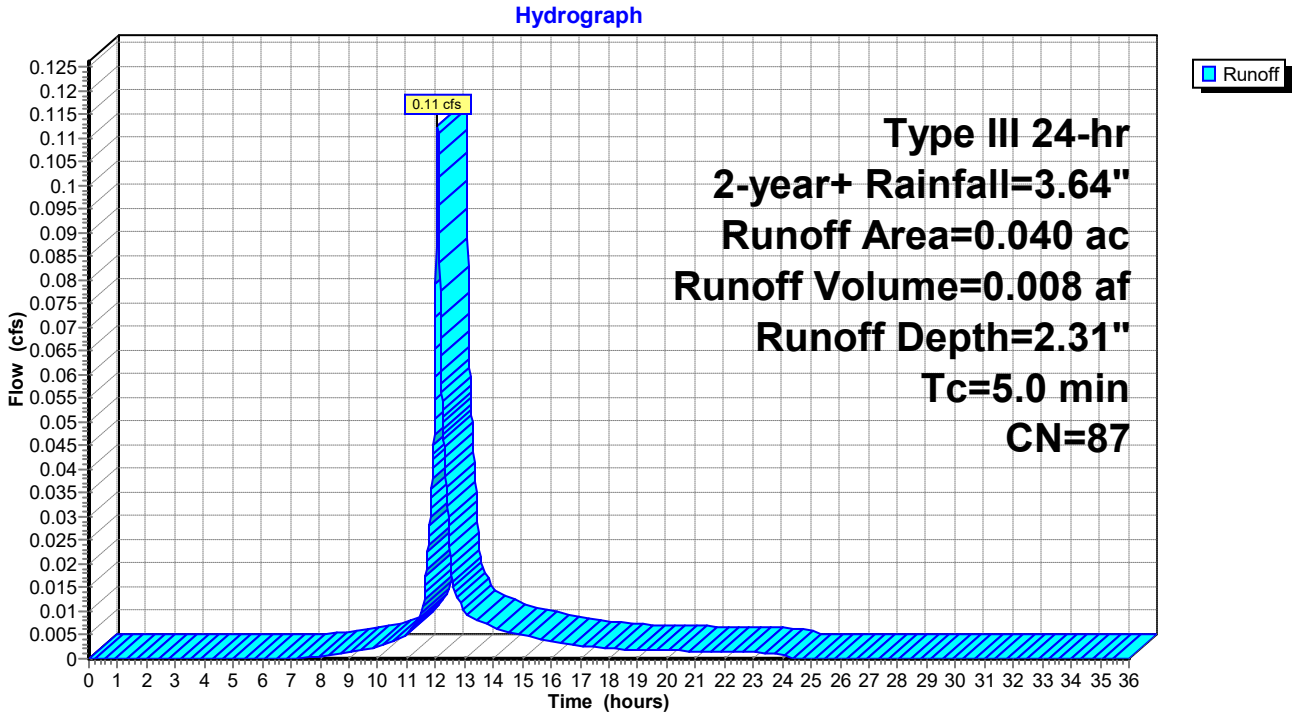
Runoff = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year+ Rainfall=3.64"

Area (ac)	CN	Description
0.026	80	>75% Grass cover, Good, HSG D
0.015	98	Paved parking, HSG D
0.040	87	Weighted Average
0.026		63.72% Pervious Area
0.015		36.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-5: Front of Site



Summary for Pond 1P: Underground Detention MC 4500

Inflow Area = 0.554 ac,100.00% Impervious, Inflow Depth = 3.18" for 2-year+ event
Inflow = 2.01 cfs @ 12.07 hrs, Volume= 0.147 af
Outflow = 0.48 cfs @ 12.44 hrs, Volume= 0.147 af, Atten= 76%, Lag= 22.1 min
Discarded = 0.07 cfs @ 9.85 hrs, Volume= 0.122 af
Primary = 0.40 cfs @ 12.44 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 72.10' @ 12.44 hrs Surf.Area= 1,341 sf Storage= 2,557 cf

Plug-Flow detention time= 215.8 min calculated for 0.147 af (100% of inflow)
Center-of-Mass det. time= 215.8 min (967.4 - 751.6)

Volume	Invert	Avail.Storage	Storage Description
#1	69.10'	2,691 cf	**Custom Stage Data (Irregular)** Listed below 9,387 cf Overall - 2,659 cf Embedded = 6,728 cf x 40.0% Voids
#2	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#3	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#4	69.85'	611 cf	**ADS_StormTech MC-4500 b +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5	69.85'	398 cf	**ADS_StormTech MC-4500 b +Cap** x 3 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
		5,350 cf	Total Available Storage

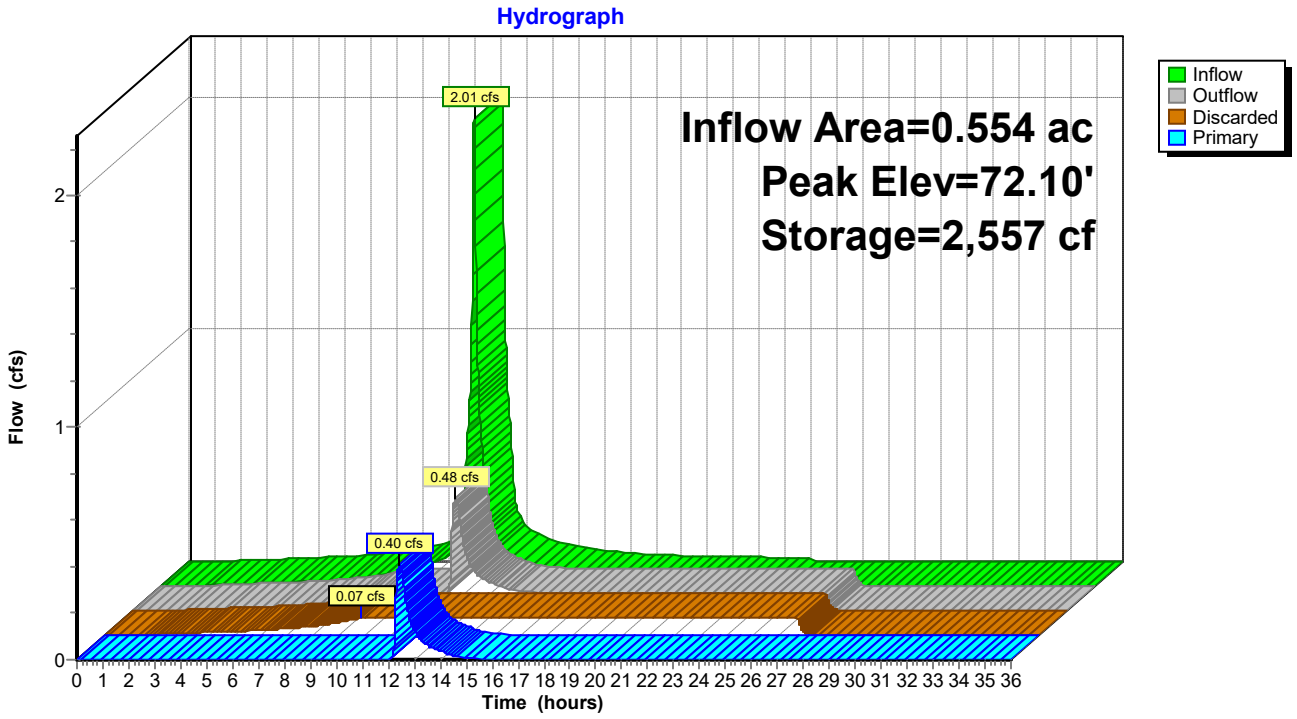
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
69.10	1,341	158.4	0	0	1,341
76.10	1,341	158.4	9,387	9,387	2,450

Device	Routing	Invert	Outlet Devices
#1	Primary	71.70'	**12.0" Round Culvert** L= 15.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 71.70' / 71.60' S= 0.0063 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	71.70'	**6.5" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	73.40'	**5.5" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	75.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Discarded	69.10'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 9.85 hrs HW=69.17' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.41 cfs @ 12.44 hrs HW=72.10' (Free Discharge)
└─**1=Culvert** (Passes 0.41 cfs of 0.46 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.41 cfs @ 2.25 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Underground Detention MC 4500



Summary for Pond 2P: Bioretention Basin

Inflow Area = 0.068 ac,100.00% Impervious, Inflow Depth = 3.41" for 2-year+ event
Inflow = 0.25 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af, Atten= 2%, Lag= 0.8 min
Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.010 af
Primary = 0.23 cfs @ 12.08 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 76.33' @ 12.08 hrs Surf.Area= 216 sf Storage= 82 cf

Plug-Flow detention time= 50.3 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 50.3 min (803.2 - 752.8)

Volume	Invert	Avail.Storage	Storage Description
#1	75.50'	127 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

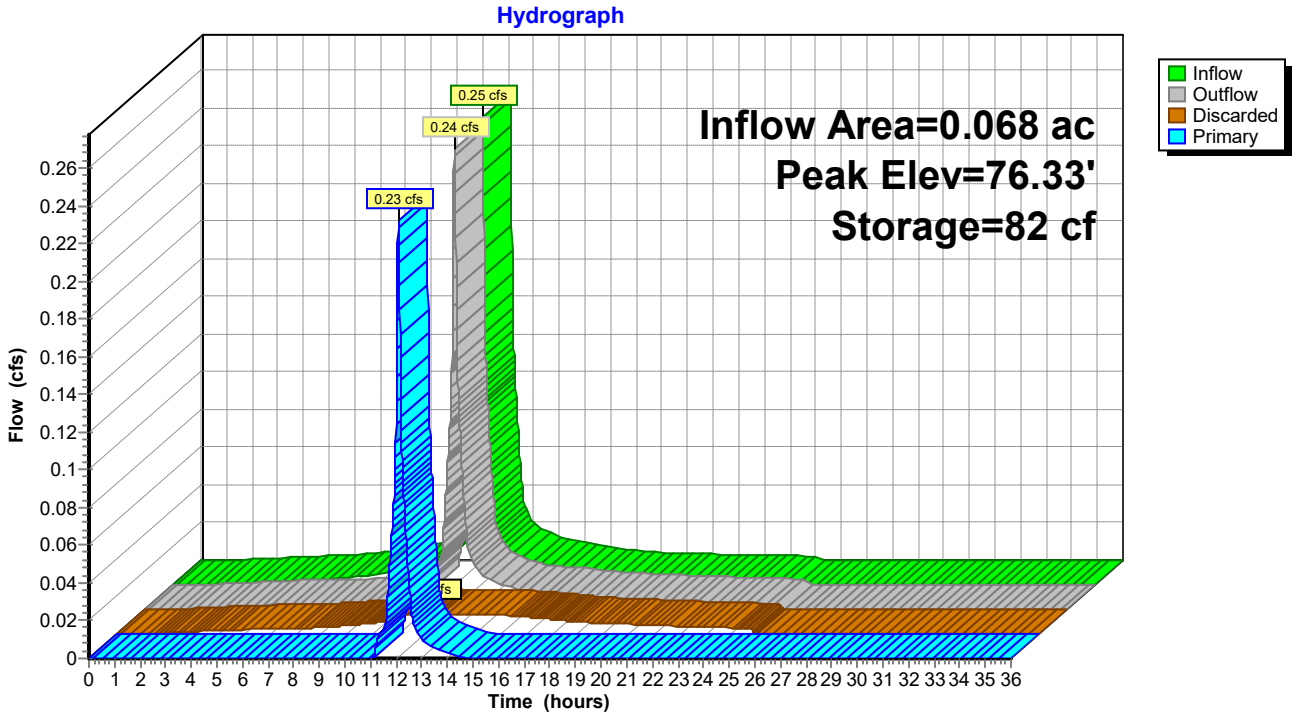
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
75.50	41	32.2	0	0	41
76.10	115	45.3	45	45	125
76.50	312	83.9	82	127	523

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	76.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads
#3	Discarded	75.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=76.33' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.23 cfs @ 12.08 hrs HW=76.33' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.23 cfs of 2.95 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.23 cfs @ 0.92 fps)

Pond 2P: Bioretention Basin



Summary for Pond 3P: Bioretention Basin

Inflow Area = 0.084 ac, 0.00% Impervious, Inflow Depth = 1.75" for 2-year+ event
Inflow = 0.18 cfs @ 12.08 hrs, Volume= 0.012 af
Outflow = 0.17 cfs @ 12.11 hrs, Volume= 0.012 af, Atten= 7%, Lag= 1.8 min
Discarded = 0.01 cfs @ 12.11 hrs, Volume= 0.005 af
Primary = 0.16 cfs @ 12.11 hrs, Volume= 0.007 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 77.74' @ 12.11 hrs Surf.Area= 122 sf Storage= 23 cf

Plug-Flow detention time= 8.7 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 8.7 min (844.0 - 835.4)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	181 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
77.50	70	56.2	0	0	70
77.90	163	68.7	45	45	197
78.50	296	80.0	136	181	338

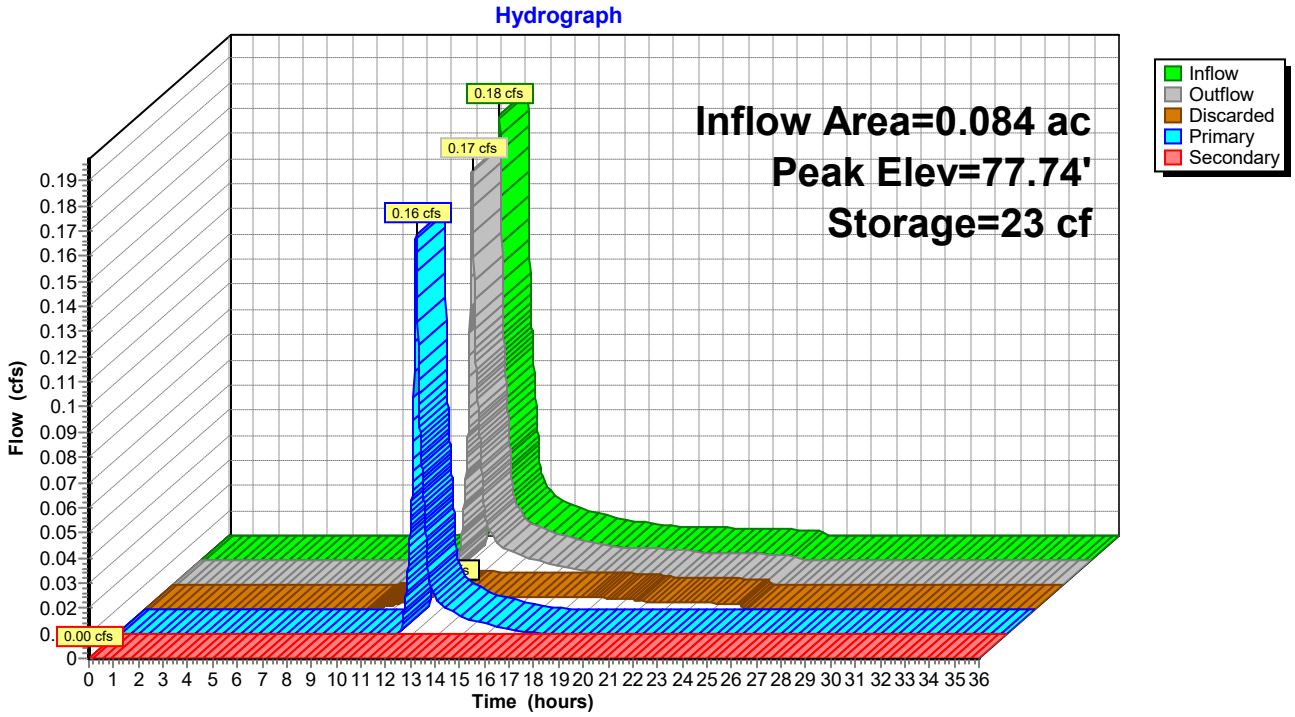
Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	77.60'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	78.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.40'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#5	Discarded	77.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.11 hrs HW=77.74' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.16 cfs @ 12.11 hrs HW=77.74' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.16 cfs of 5.38 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 1.82 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=77.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Bioretention Basin

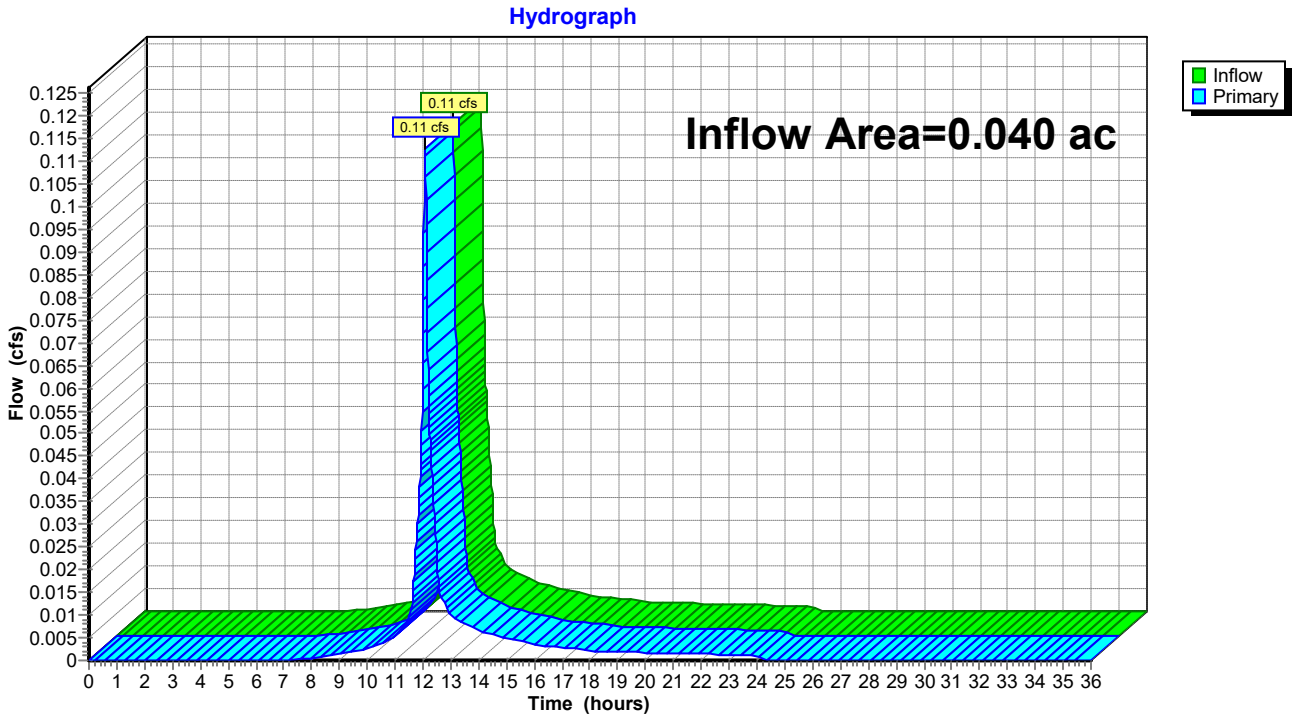


Summary for Link DP-1: Dudley Street

Inflow Area = 0.040 ac, 36.28% Impervious, Inflow Depth = 2.31" for 2-year+ event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af
Primary = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

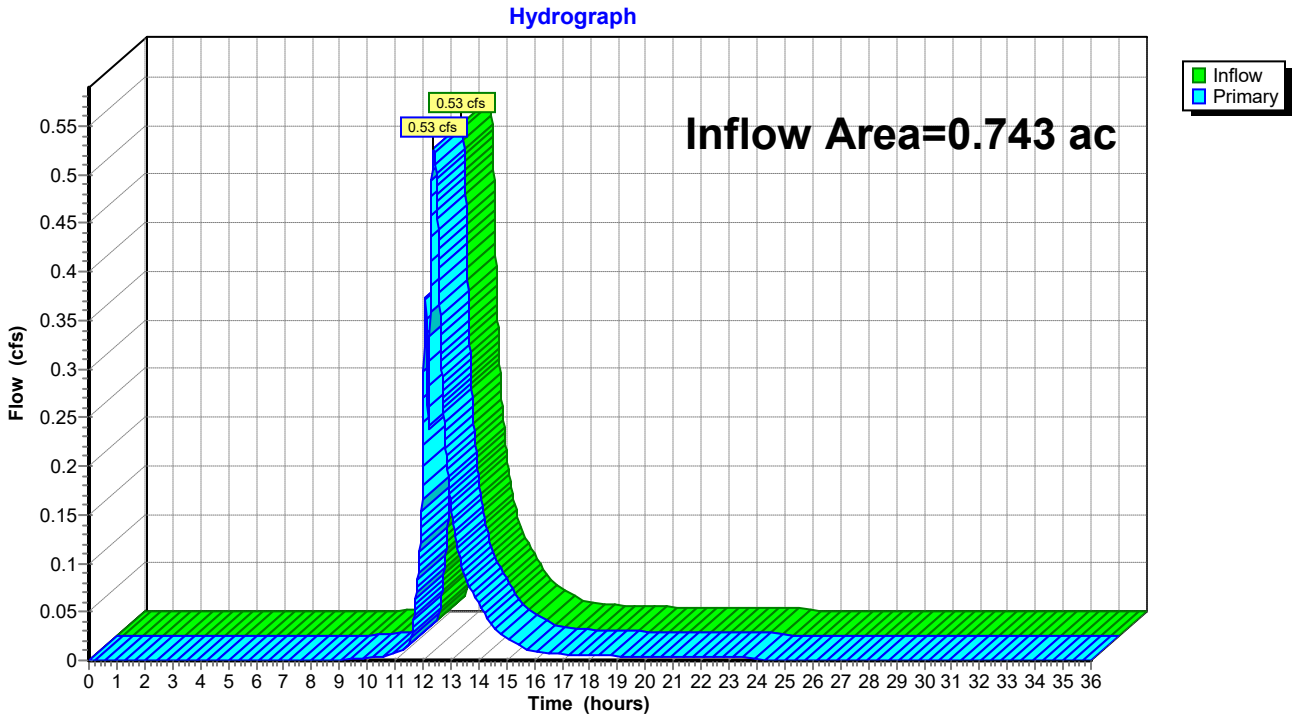


Summary for Link DP-2: Mill Brook

Inflow Area = 0.743 ac, 74.86% Impervious, Inflow Depth = 0.76" for 2-year+ event
Inflow = 0.53 cfs @ 12.39 hrs, Volume= 0.047 af
Primary = 0.53 cfs @ 12.39 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



10-Year Storm Event – Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Roof Runoff Area=0.480 ac 100.00% Impervious Runoff Depth=5.55"
Tc=5.0 min CN=98 Runoff=2.82 cfs 0.222 af

Subcatchment PR-2a: Subcat PR-2a Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=3.59"
Tc=5.0 min CN=80 Runoff=0.36 cfs 0.025 af

Subcatchment PR-2b: Subcat PR-2b Runoff Area=0.105 ac 1.89% Impervious Runoff Depth=3.59"
Tc=5.0 min CN=80 Runoff=0.46 cfs 0.031 af

Subcatchment PR-3: Pavement Runoff Area=0.006 ac 100.00% Impervious Runoff Depth=5.55"
Tc=5.0 min CN=98 Runoff=0.04 cfs 0.003 af

Subcatchment PR-4: Pavement Runoff Area=0.068 ac 100.00% Impervious Runoff Depth=5.55"
Tc=5.0 min CN=98 Runoff=0.40 cfs 0.031 af

Subcatchment PR-5: Front of Site Runoff Area=0.040 ac 36.28% Impervious Runoff Depth=4.32"
Tc=5.0 min CN=87 Runoff=0.21 cfs 0.015 af

Pond 1P: Underground Detention MC 4500 Peak Elev=73.45' Storage=3,725 cf Inflow=3.23 cfs 0.243 af
Discarded=0.07 cfs 0.145 af Primary=1.11 cfs 0.098 af Outflow=1.18 cfs 0.243 af

Pond 2P: Bioretention Basin Peak Elev=76.36' Storage=89 cf Inflow=0.40 cfs 0.031 af
Discarded=0.01 cfs 0.014 af Primary=0.38 cfs 0.018 af Outflow=0.39 cfs 0.031 af

Pond 3P: Bioretention Basin Peak Elev=78.01' Storage=65 cf Inflow=0.36 cfs 0.025 af
Discarded=0.01 cfs 0.007 af Primary=0.27 cfs 0.018 af Secondary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.025 af

Link DP-1: Dudley Street Inflow=0.21 cfs 0.015 af
Primary=0.21 cfs 0.015 af

Link DP-2: Mill Brook Inflow=1.60 cfs 0.147 af
Primary=1.60 cfs 0.147 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.327 af Average Runoff Depth = 5.02"
27.13% Pervious = 0.212 ac 72.87% Impervious = 0.571 ac

Summary for Subcatchment PR-1: Roof

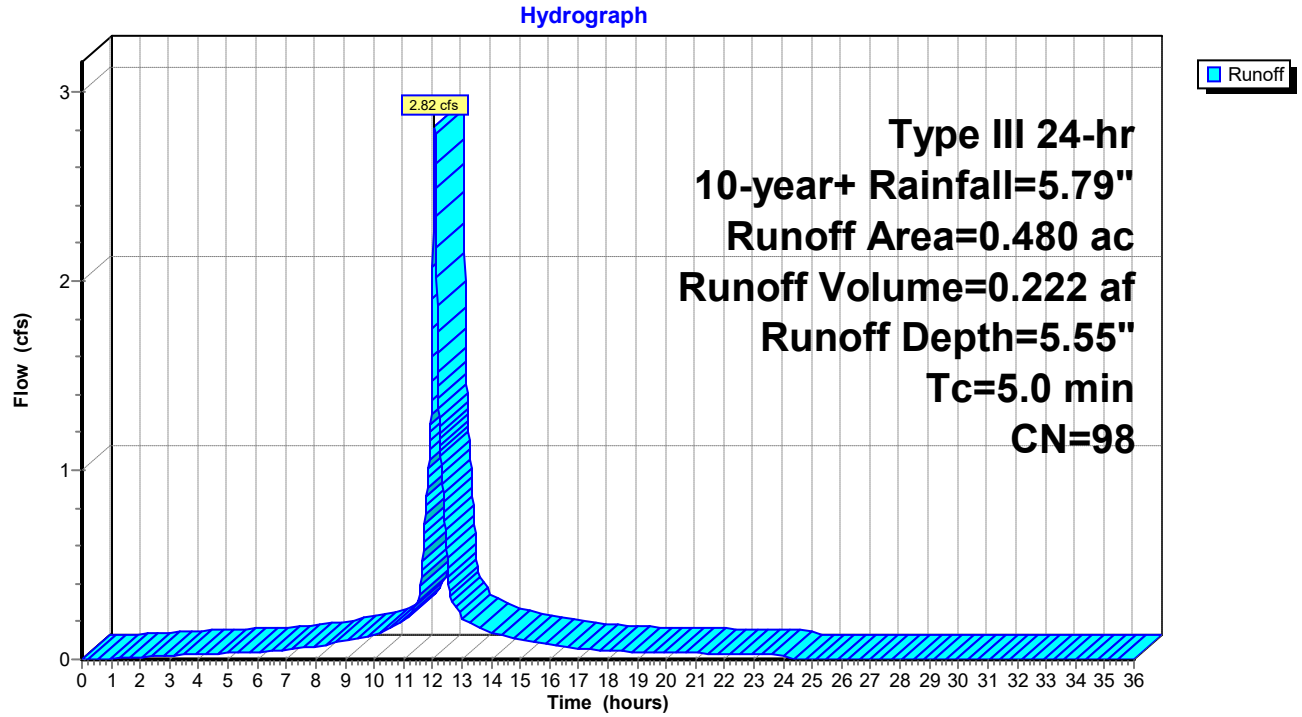
Runoff = 2.82 cfs @ 12.07 hrs, Volume= 0.222 af, Depth= 5.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-1: Roof



Summary for Subcatchment PR-2a: Subcat PR-2a

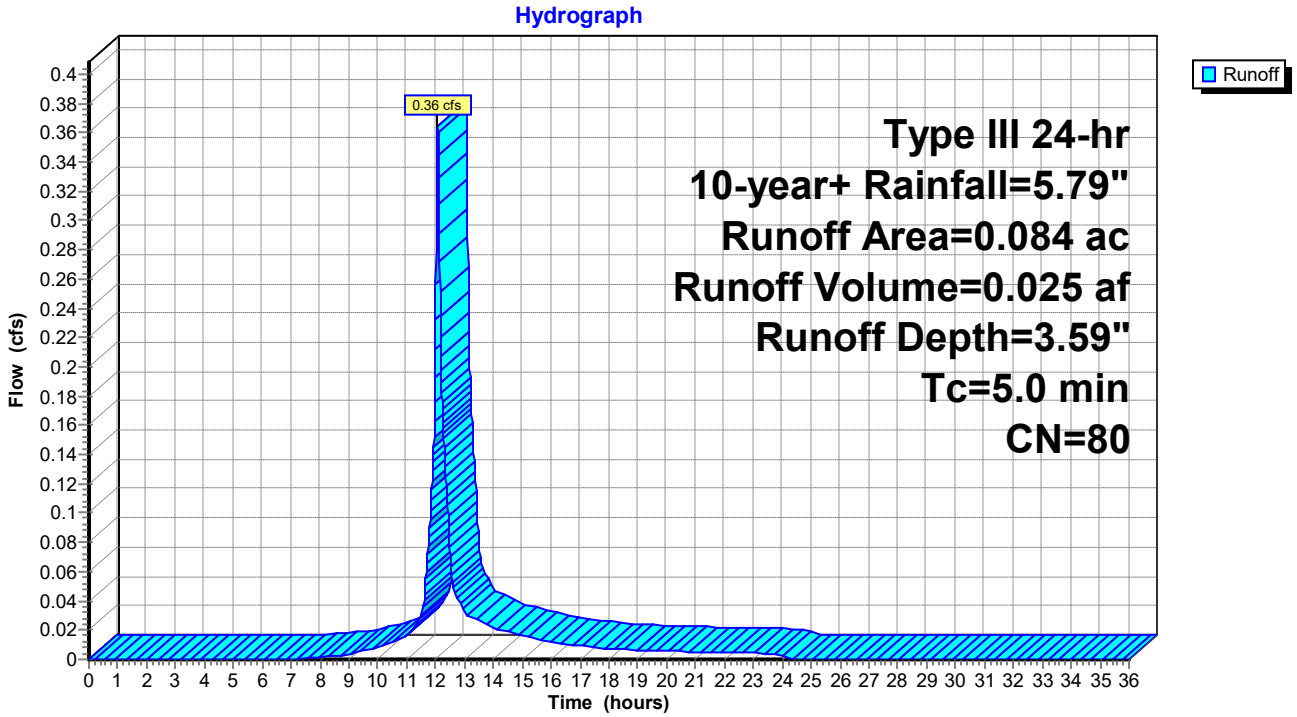
Runoff = 0.36 cfs @ 12.07 hrs, Volume= 0.025 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.084	80	>75% Grass cover, Good, HSG D
0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2a: Subcat PR-2a



Summary for Subcatchment PR-2b: Subcat PR-2b

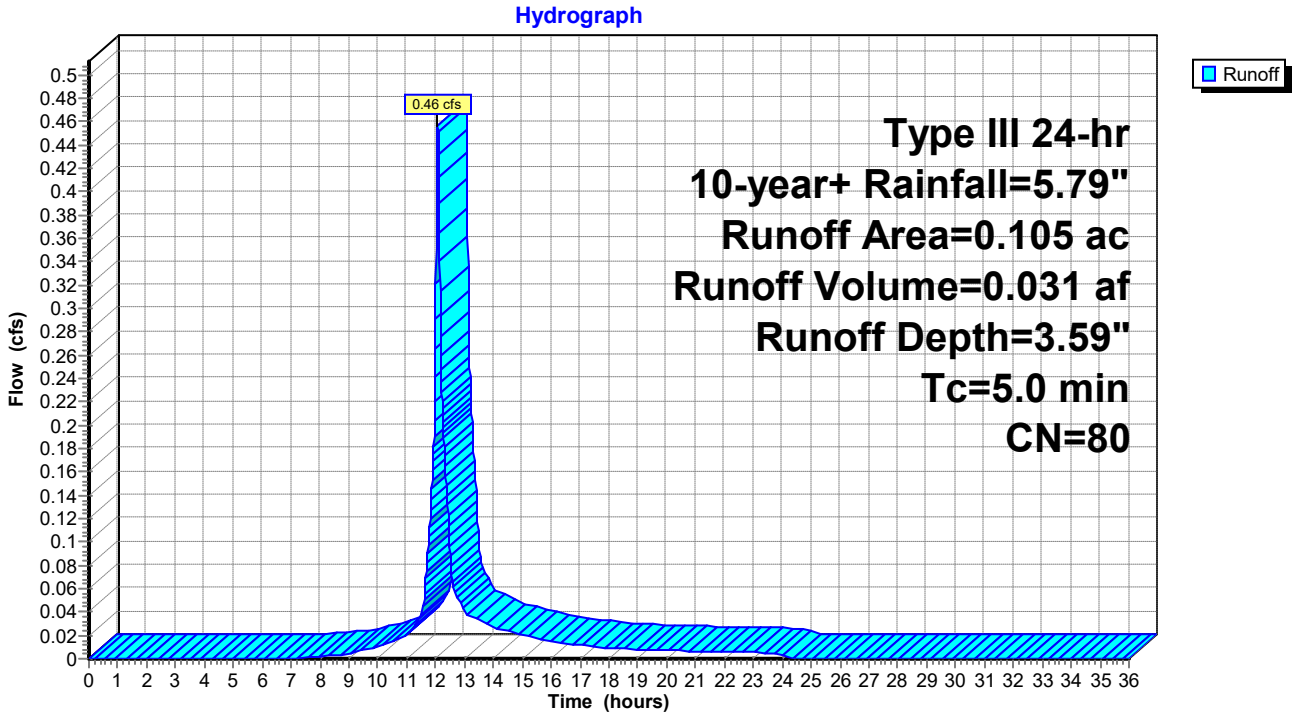
Runoff = 0.46 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.103	80	>75% Grass cover, Good, HSG D
0.002	98	Paved parking, HSG D
0.105	80	Weighted Average
0.103		98.11% Pervious Area
0.002		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2b: Subcat PR-2b



Summary for Subcatchment PR-3: Pavement

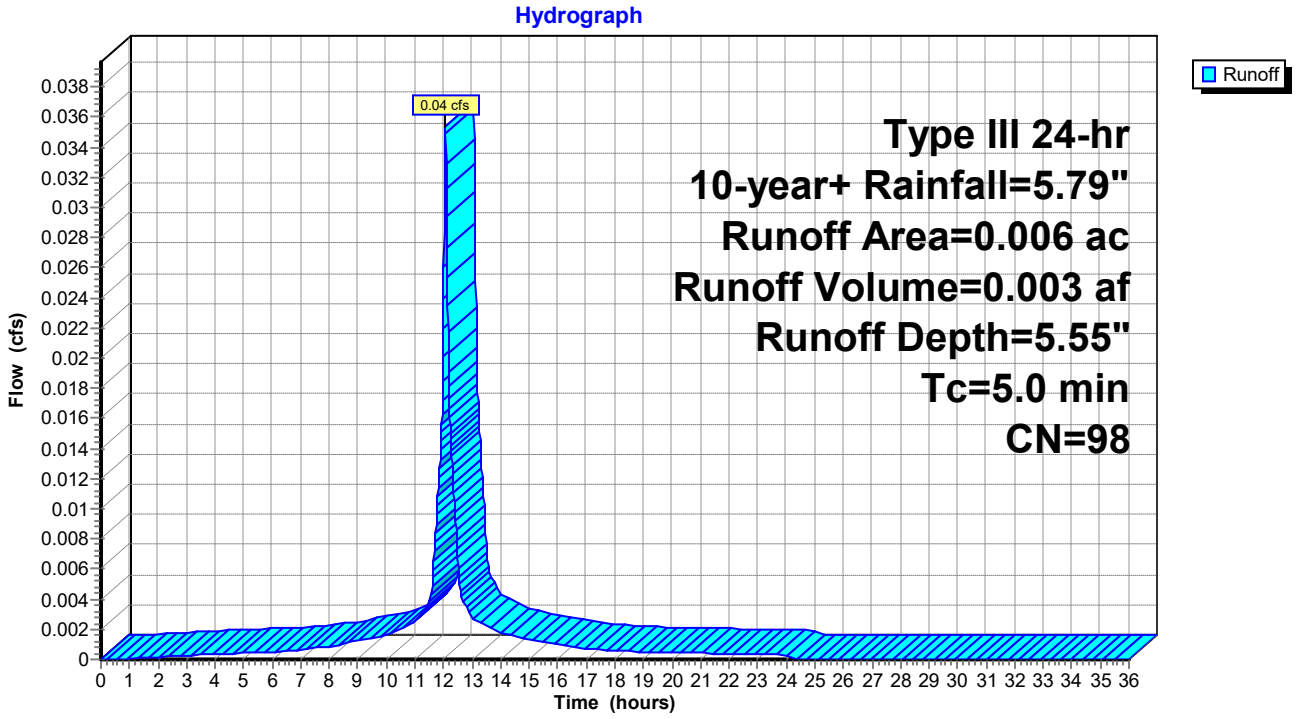
Runoff = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 5.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG D
0.006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-3: Pavement



Summary for Subcatchment PR-4: Pavement

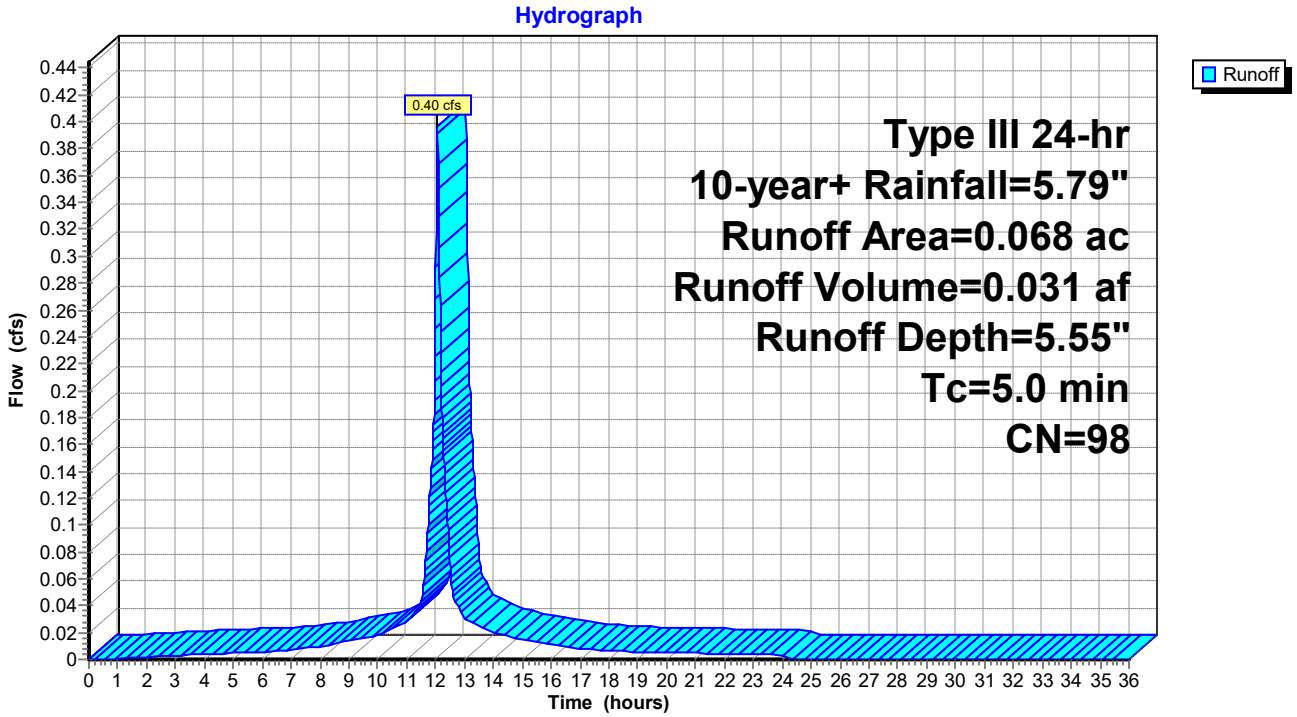
Runoff = 0.40 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 5.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG D
0.068		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-4: Pavement



Summary for Subcatchment PR-5: Front of Site

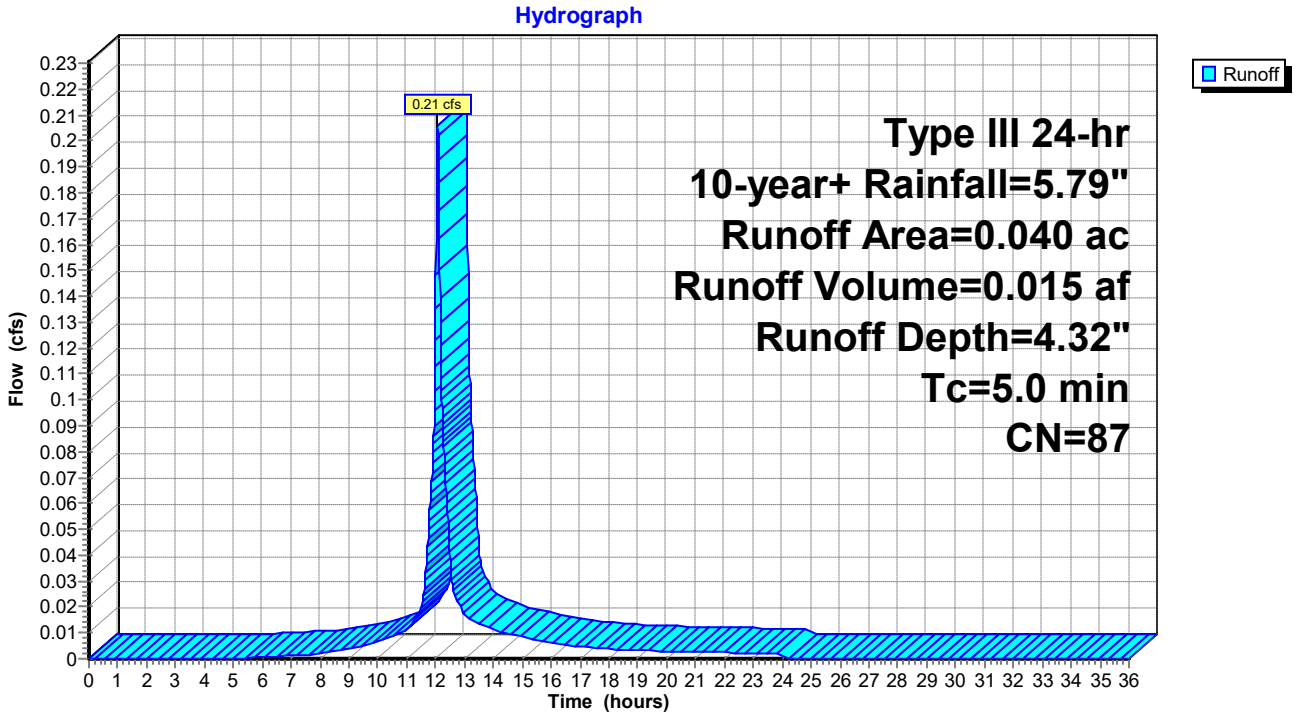
Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 4.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year+ Rainfall=5.79"

Area (ac)	CN	Description
0.026	80	>75% Grass cover, Good, HSG D
0.015	98	Paved parking, HSG D
0.040	87	Weighted Average
0.026		63.72% Pervious Area
0.015		36.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-5: Front of Site



Summary for Pond 1P: Underground Detention MC 4500

Inflow Area = 0.554 ac,100.00% Impervious, Inflow Depth = 5.26" for 10-year+ event
Inflow = 3.23 cfs @ 12.07 hrs, Volume= 0.243 af
Outflow = 1.18 cfs @ 12.30 hrs, Volume= 0.243 af, Atten= 63%, Lag= 13.5 min
Discarded = 0.07 cfs @ 8.37 hrs, Volume= 0.145 af
Primary = 1.11 cfs @ 12.30 hrs, Volume= 0.098 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 73.45' @ 12.30 hrs Surf.Area= 1,341 sf Storage= 3,725 cf

Plug-Flow detention time= 169.7 min calculated for 0.243 af (100% of inflow)
Center-of-Mass det. time= 169.7 min (913.5 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1	69.10'	2,691 cf	**Custom Stage Data (Irregular)** Listed below 9,387 cf Overall - 2,659 cf Embedded = 6,728 cf x 40.0% Voids
#2	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#3	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#4	69.85'	611 cf	**ADS_StormTech MC-4500 b +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5	69.85'	398 cf	**ADS_StormTech MC-4500 b +Cap** x 3 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
		5,350 cf	Total Available Storage

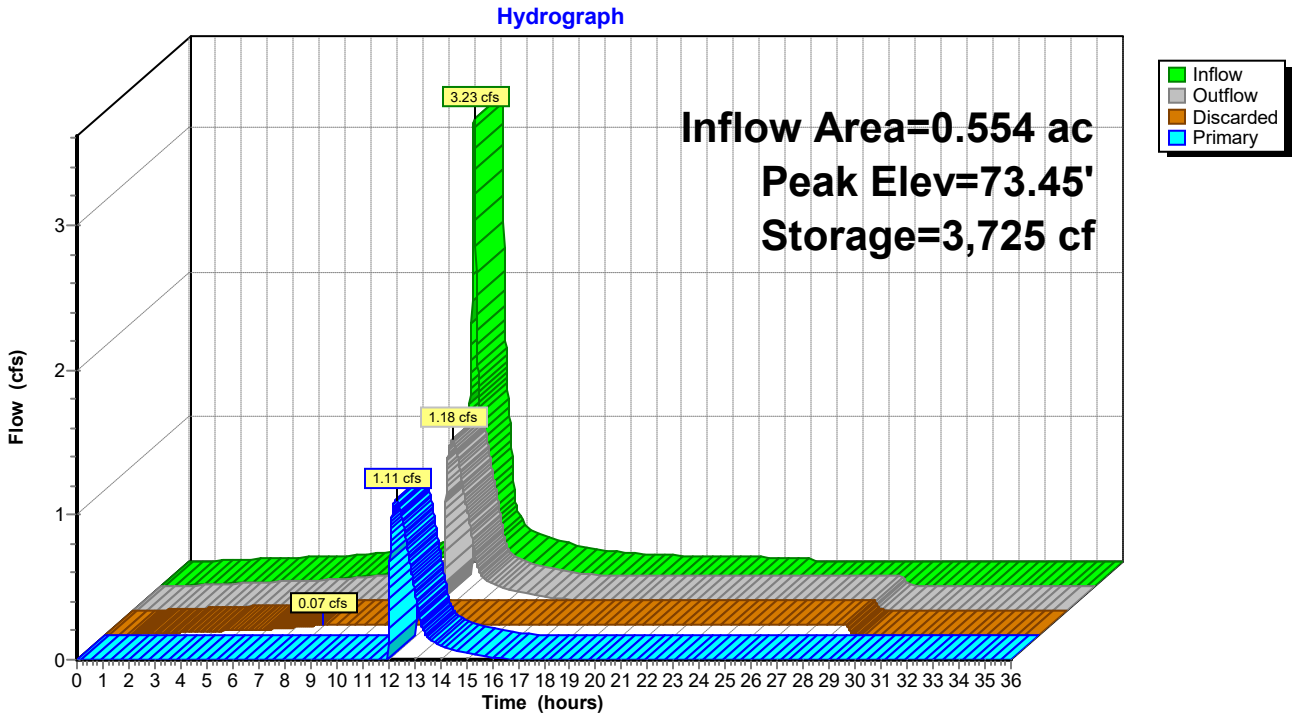
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
69.10	1,341	158.4	0	0	1,341
76.10	1,341	158.4	9,387	9,387	2,450

Device	Routing	Invert	Outlet Devices
#1	Primary	71.70'	**12.0" Round Culvert** L= 15.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 71.70' / 71.60' S= 0.0063 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	71.70'	**6.5" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	73.40'	**5.5" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	75.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Discarded	69.10'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 8.37 hrs HW=69.17' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=1.11 cfs @ 12.30 hrs HW=73.45' (Free Discharge)
└**1=Culvert** (Passes 1.11 cfs of 4.10 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 1.09 cfs @ 6.05 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.69 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Underground Detention MC 4500



Summary for Pond 2P: Bioretention Basin

Inflow Area = 0.068 ac,100.00% Impervious, Inflow Depth = 5.55" for 10-year+ event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 0.031 af
Outflow = 0.39 cfs @ 12.08 hrs, Volume= 0.031 af, Atten= 1%, Lag= 0.8 min
Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.014 af
Primary = 0.38 cfs @ 12.08 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 76.36' @ 12.08 hrs Surf.Area= 232 sf Storage= 89 cf

Plug-Flow detention time= 43.7 min calculated for 0.031 af (100% of inflow)
Center-of-Mass det. time= 43.7 min (788.4 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	75.50'	127 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

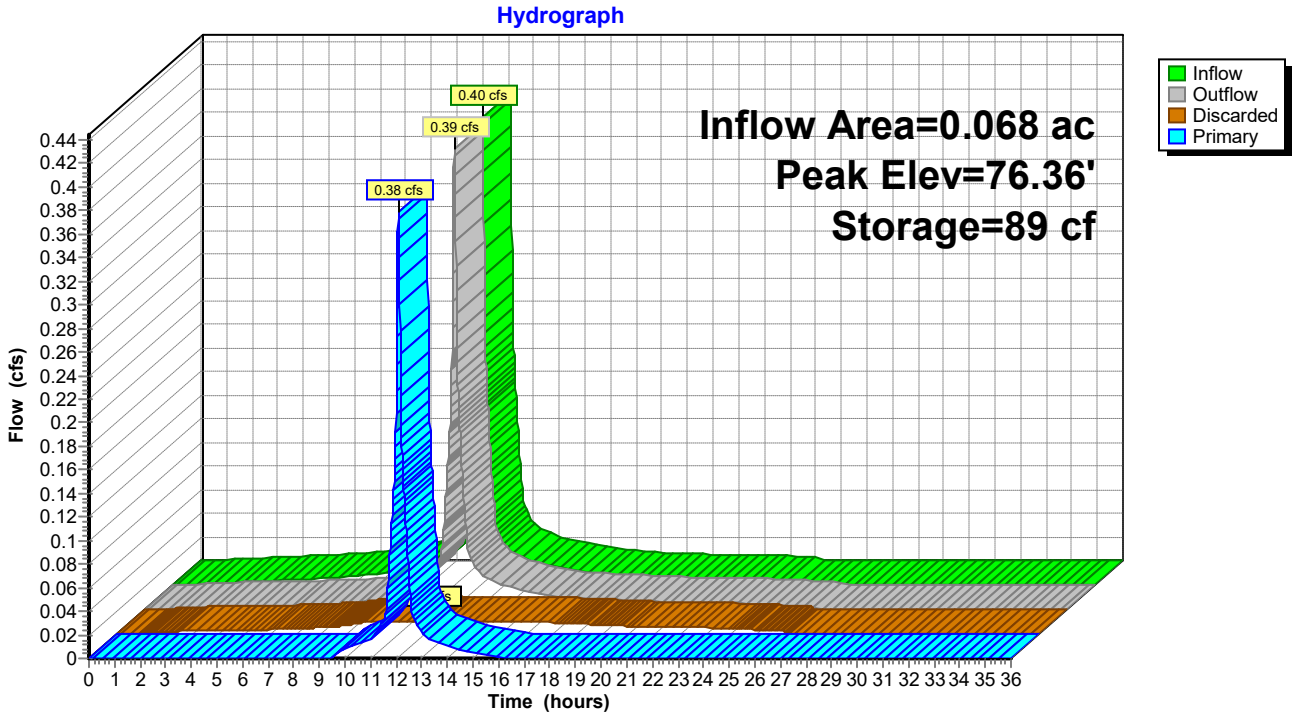
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
75.50	41	32.2	0	0	41
76.10	115	45.3	45	45	125
76.50	312	83.9	82	127	523

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	76.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads
#3	Discarded	75.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=76.36' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.38 cfs @ 12.08 hrs HW=76.36' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.38 cfs of 3.03 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.38 cfs @ 1.09 fps)

Pond 2P: Bioretention Basin



Summary for Pond 3P: Bioretention Basin

Inflow Area = 0.084 ac, 0.00% Impervious, Inflow Depth = 3.59" for 10-year+ event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 0.025 af
Outflow = 0.28 cfs @ 12.14 hrs, Volume= 0.025 af, Atten= 23%, Lag= 3.7 min
Discarded = 0.01 cfs @ 12.14 hrs, Volume= 0.007 af
Primary = 0.27 cfs @ 12.14 hrs, Volume= 0.018 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 78.01' @ 12.14 hrs Surf.Area= 185 sf Storage= 65 cf

Plug-Flow detention time= 8.0 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 8.0 min (822.7 - 814.7)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	181 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
77.50	70	56.2	0	0	70
77.90	163	68.7	45	45	197
78.50	296	80.0	136	181	338

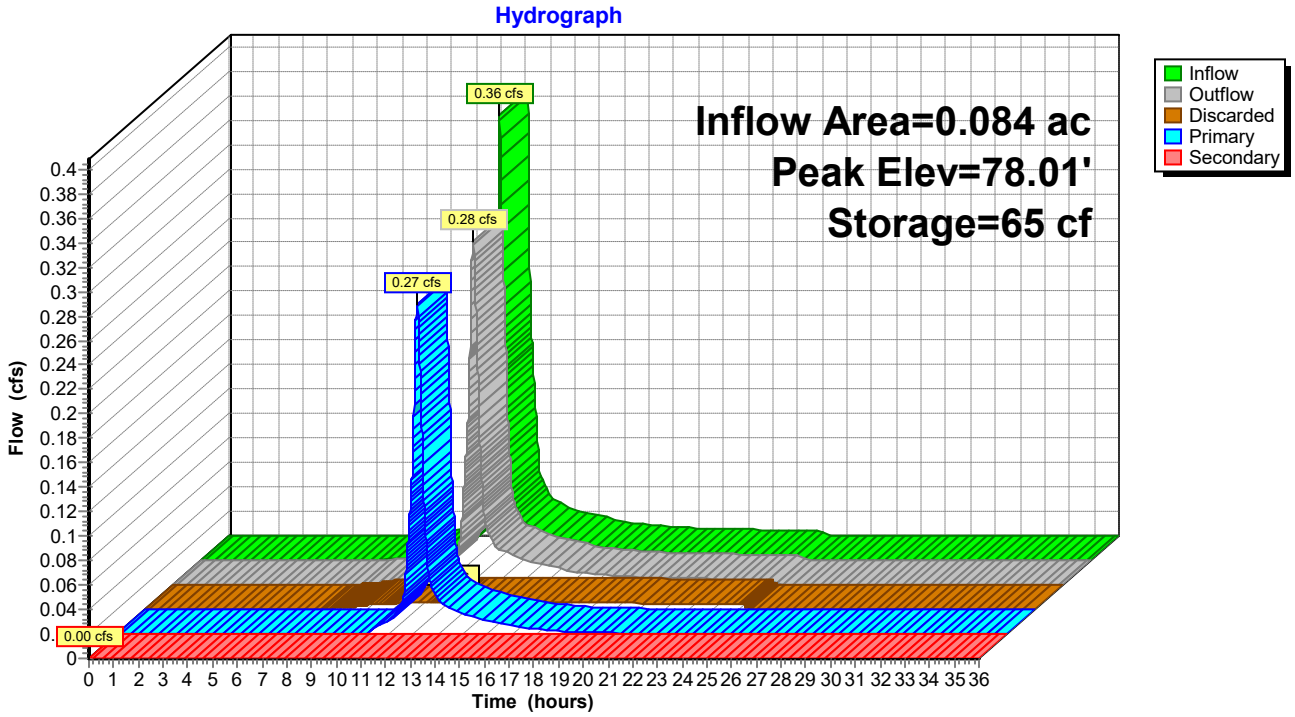
Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	77.60'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	78.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.40'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#5	Discarded	77.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=78.01' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.27 cfs @ 12.14 hrs HW=78.01' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.27 cfs of 5.73 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 3.09 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=77.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Bioretention Basin

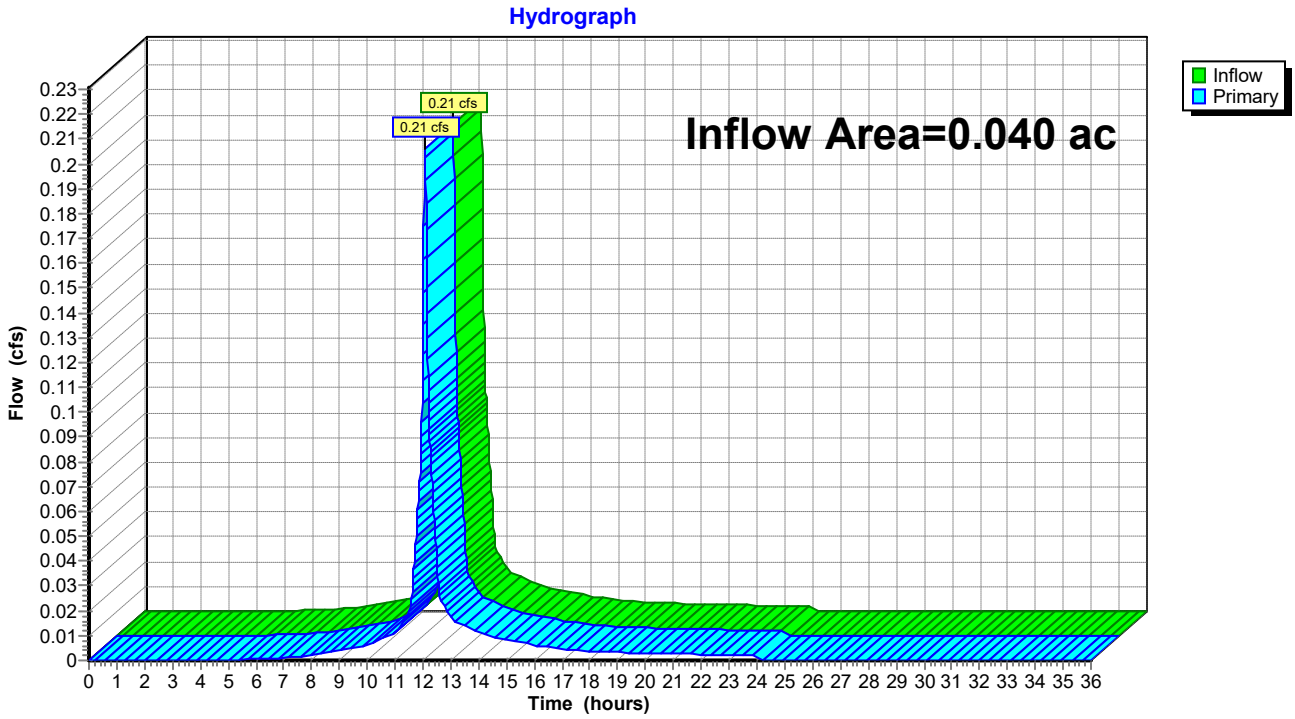


Summary for Link DP-1: Dudley Street

Inflow Area = 0.040 ac, 36.28% Impervious, Inflow Depth = 4.32" for 10-year+ event
Inflow = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af
Primary = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

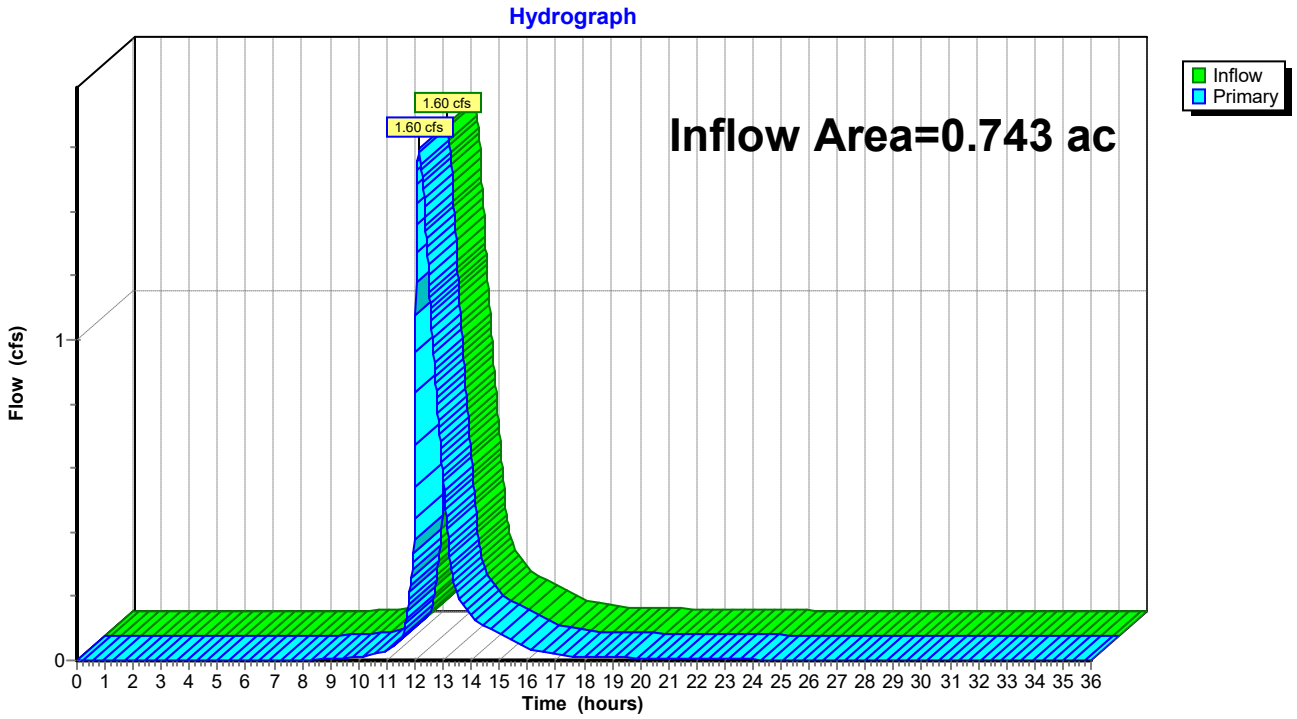


Summary for Link DP-2: Mill Brook

Inflow Area = 0.743 ac, 74.86% Impervious, Inflow Depth = 2.38" for 10-year+ event
Inflow = 1.60 cfs @ 12.13 hrs, Volume= 0.147 af
Primary = 1.60 cfs @ 12.13 hrs, Volume= 0.147 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



25-Year Storm Event – Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Roof Runoff Area=0.480 ac 100.00% Impervious Runoff Depth=7.25"
Tc=5.0 min CN=98 Runoff=3.66 cfs 0.290 af

Subcatchment PR-2a: Subcat PR-2a Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=5.15"
Tc=5.0 min CN=80 Runoff=0.52 cfs 0.036 af

Subcatchment PR-2b: Subcat PR-2b Runoff Area=0.105 ac 1.89% Impervious Runoff Depth=5.15"
Tc=5.0 min CN=80 Runoff=0.65 cfs 0.045 af

Subcatchment PR-3: Pavement Runoff Area=0.006 ac 100.00% Impervious Runoff Depth=7.25"
Tc=5.0 min CN=98 Runoff=0.05 cfs 0.004 af

Subcatchment PR-4: Pavement Runoff Area=0.068 ac 100.00% Impervious Runoff Depth=7.25"
Tc=5.0 min CN=98 Runoff=0.51 cfs 0.041 af

Subcatchment PR-5: Front of Site Runoff Area=0.040 ac 36.28% Impervious Runoff Depth=5.95"
Tc=5.0 min CN=87 Runoff=0.28 cfs 0.020 af

Pond 1P: Underground Detention MC 4500 Peak Elev=74.29' Storage=4,356 cf Inflow=4.19 cfs 0.319 af
Discarded=0.07 cfs 0.159 af Primary=2.23 cfs 0.160 af Outflow=2.31 cfs 0.319 af

Pond 2P: Bioretention Basin Peak Elev=76.38' Storage=94 cf Inflow=0.51 cfs 0.041 af
Discarded=0.01 cfs 0.015 af Primary=0.49 cfs 0.025 af Outflow=0.51 cfs 0.041 af

Pond 3P: Bioretention Basin Peak Elev=78.26' Storage=117 cf Inflow=0.52 cfs 0.036 af
Discarded=0.01 cfs 0.008 af Primary=0.34 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.036 af

Link DP-1: Dudley Street Inflow=0.28 cfs 0.020 af
Primary=0.28 cfs 0.020 af

Link DP-2: Mill Brook Inflow=2.98 cfs 0.234 af
Primary=2.98 cfs 0.234 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.436 af Average Runoff Depth = 6.68"
27.13% Pervious = 0.212 ac 72.87% Impervious = 0.571 ac

Summary for Subcatchment PR-1: Roof

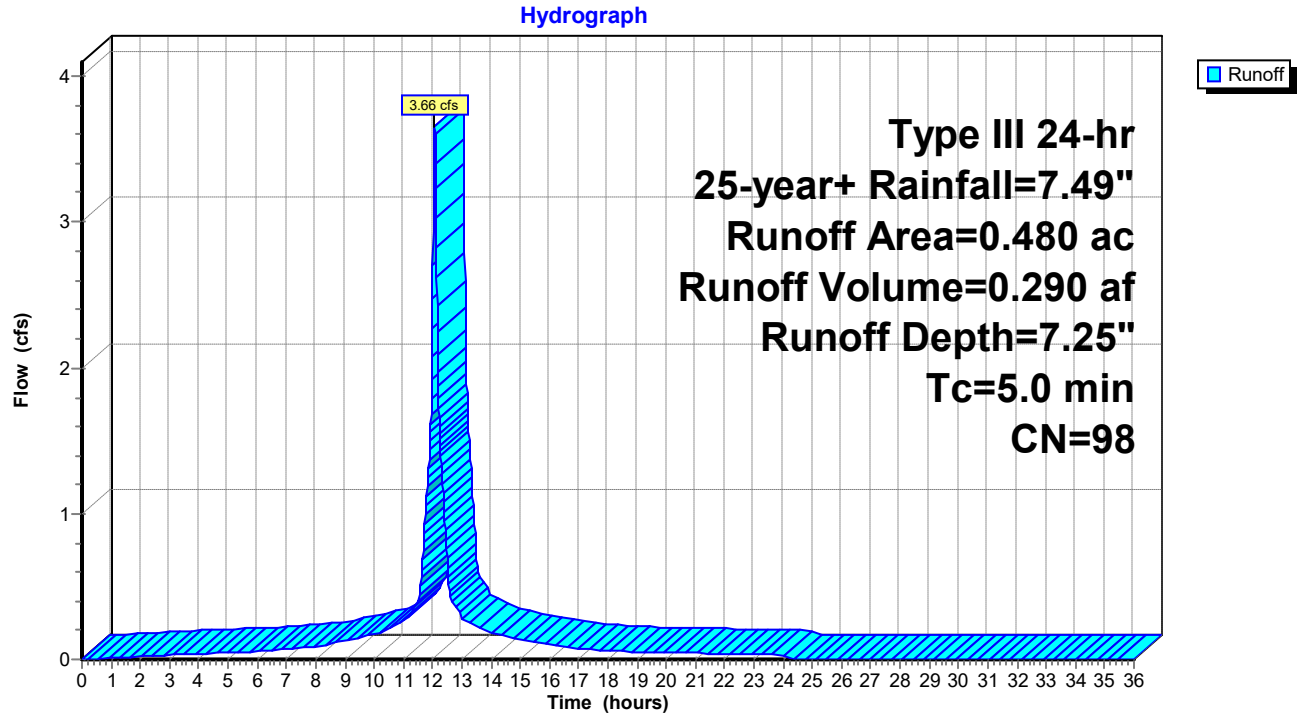
Runoff = 3.66 cfs @ 12.07 hrs, Volume= 0.290 af, Depth= 7.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-1: Roof



Summary for Subcatchment PR-2a: Subcat PR-2a

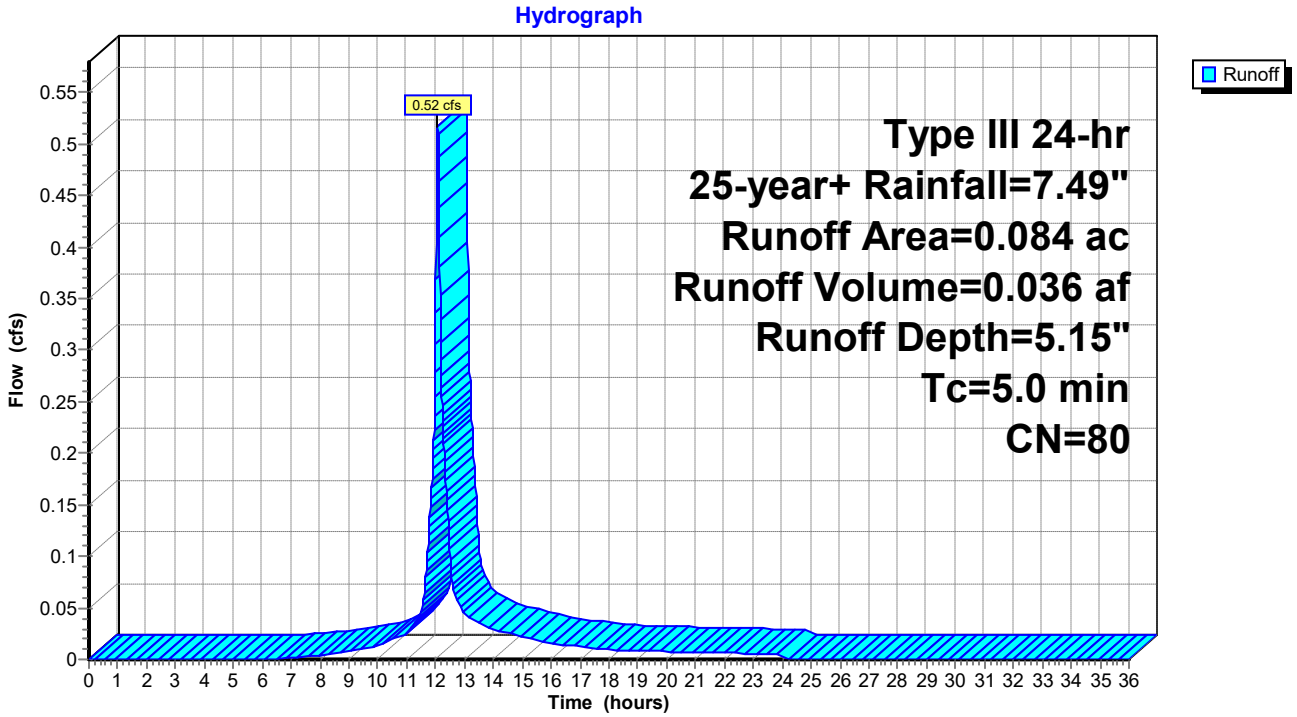
Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.036 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.084	80	>75% Grass cover, Good, HSG D
0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2a: Subcat PR-2a



Summary for Subcatchment PR-2b: Subcat PR-2b

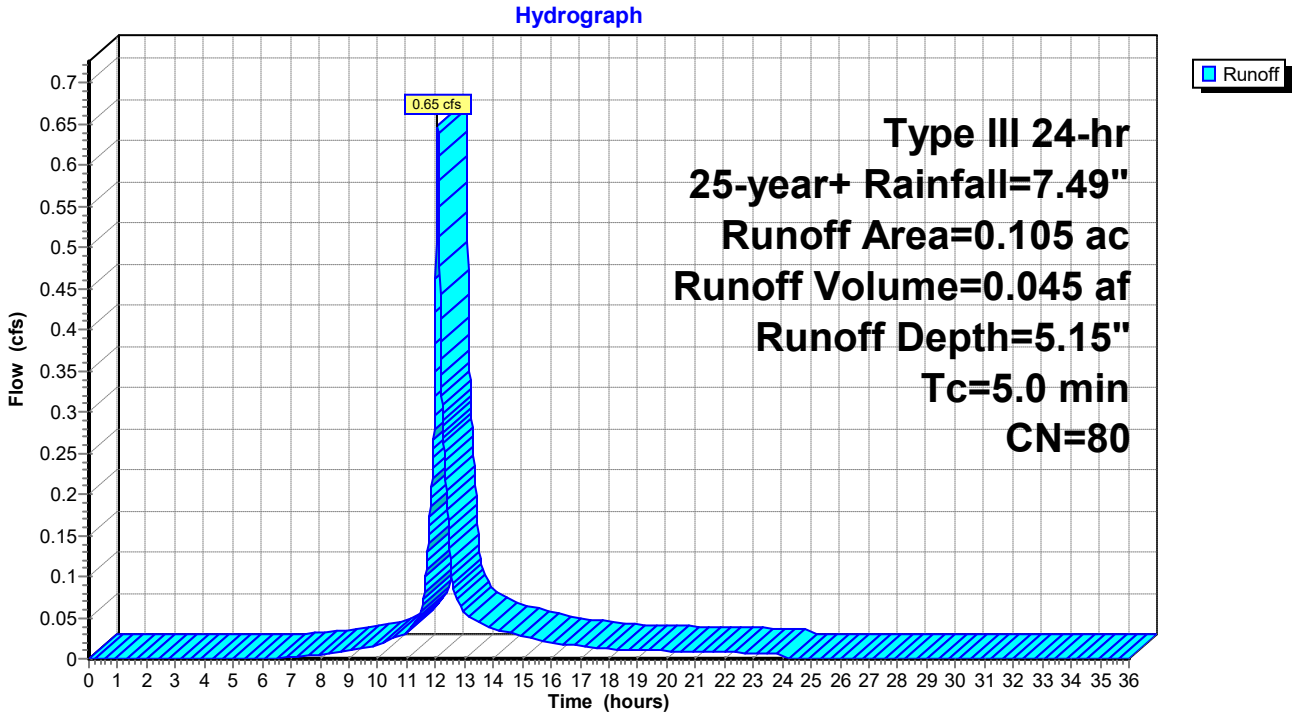
Runoff = 0.65 cfs @ 12.07 hrs, Volume= 0.045 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.103	80	>75% Grass cover, Good, HSG D
0.002	98	Paved parking, HSG D
0.105	80	Weighted Average
0.103		98.11% Pervious Area
0.002		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2b: Subcat PR-2b



Summary for Subcatchment PR-3: Pavement

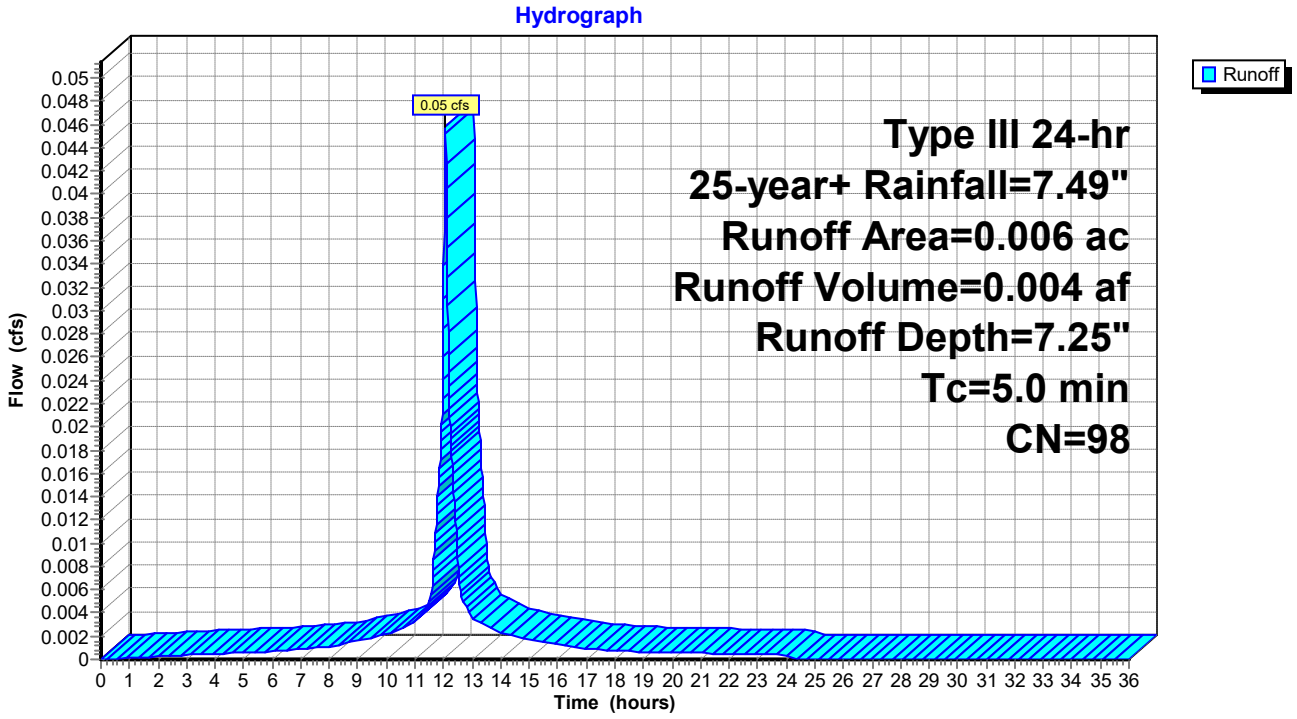
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 7.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG D
0.006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-3: Pavement



Summary for Subcatchment PR-4: Pavement

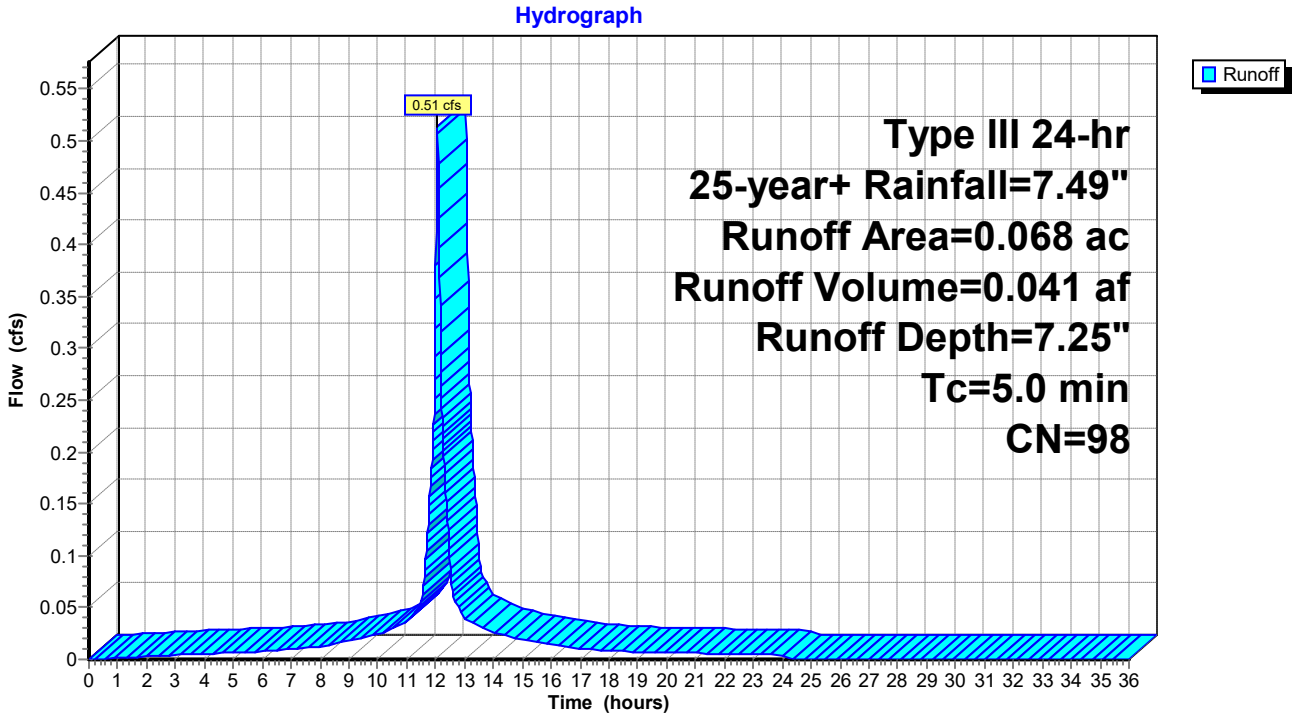
Runoff = 0.51 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 7.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG D
0.068		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-4: Pavement



Summary for Subcatchment PR-5: Front of Site

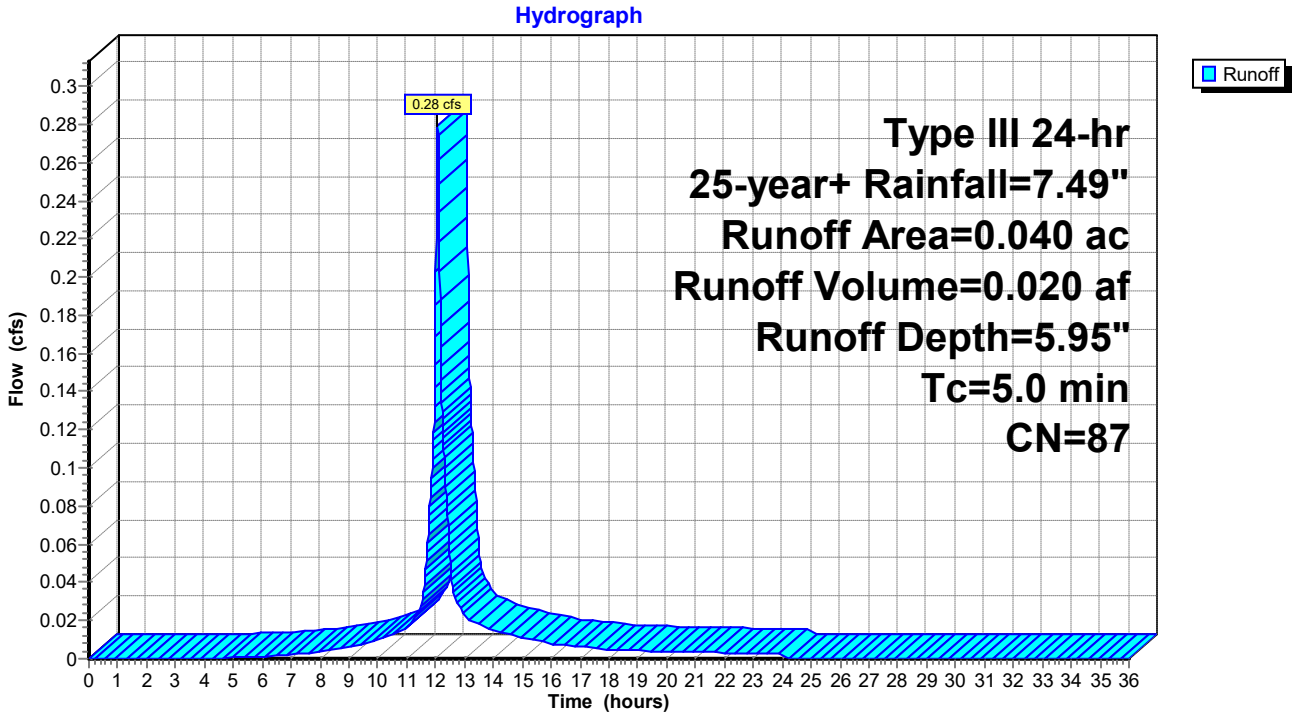
Runoff = 0.28 cfs @ 12.07 hrs, Volume= 0.020 af, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year+ Rainfall=7.49"

Area (ac)	CN	Description
0.026	80	>75% Grass cover, Good, HSG D
0.015	98	Paved parking, HSG D
0.040	87	Weighted Average
0.026		63.72% Pervious Area
0.015		36.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-5: Front of Site



Summary for Pond 1P: Underground Detention MC 4500

Inflow Area = 0.554 ac,100.00% Impervious, Inflow Depth = 6.92" for 25-year+ event
Inflow = 4.19 cfs @ 12.07 hrs, Volume= 0.319 af
Outflow = 2.31 cfs @ 12.18 hrs, Volume= 0.319 af, Atten= 45%, Lag= 6.5 min
Discarded = 0.07 cfs @ 7.32 hrs, Volume= 0.159 af
Primary = 2.23 cfs @ 12.18 hrs, Volume= 0.160 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 74.29' @ 12.18 hrs Surf.Area= 1,341 sf Storage= 4,356 cf

Plug-Flow detention time= 149.6 min calculated for 0.319 af (100% of inflow)
Center-of-Mass det. time= 149.6 min (889.9 - 740.3)

Volume	Invert	Avail.Storage	Storage Description
#1	69.10'	2,691 cf	**Custom Stage Data (Irregular)** Listed below 9,387 cf Overall - 2,659 cf Embedded = 6,728 cf x 40.0% Voids
#2	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#3	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#4	69.85'	611 cf	**ADS_StormTech MC-4500 b +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5	69.85'	398 cf	**ADS_StormTech MC-4500 b +Cap** x 3 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
		5,350 cf	Total Available Storage

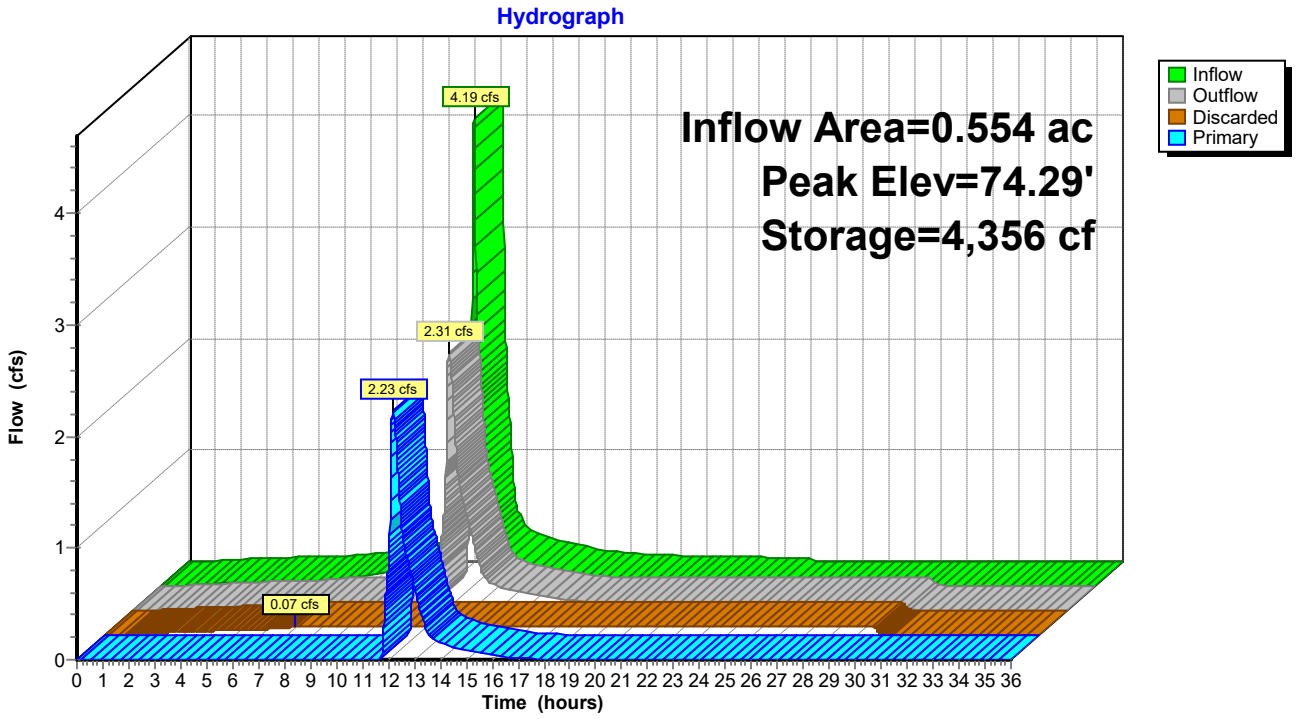
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
69.10	1,341	158.4	0	0	1,341
76.10	1,341	158.4	9,387	9,387	2,450

Device	Routing	Invert	Outlet Devices
#1	Primary	71.70'	**12.0" Round Culvert** L= 15.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 71.70' / 71.60' S= 0.0063 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	71.70'	**6.5" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	73.40'	**5.5" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	75.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Discarded	69.10'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 7.32 hrs HW=69.17' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=2.23 cfs @ 12.18 hrs HW=74.29' (Free Discharge)
└─**1=Culvert** (Passes 2.23 cfs of 5.47 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 1.35 cfs @ 7.50 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.88 cfs @ 3.84 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Underground Detention MC 4500



Summary for Pond 2P: Bioretention Basin

Inflow Area = 0.068 ac,100.00% Impervious, Inflow Depth = 7.25" for 25-year+ event
Inflow = 0.51 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.51 cfs @ 12.08 hrs, Volume= 0.041 af, Atten= 1%, Lag= 0.7 min
Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.015 af
Primary = 0.49 cfs @ 12.08 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 76.38' @ 12.08 hrs Surf.Area= 244 sf Storage= 94 cf

Plug-Flow detention time= 39.3 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 39.3 min (780.4 - 741.1)

Volume	Invert	Avail.Storage	Storage Description
#1	75.50'	127 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

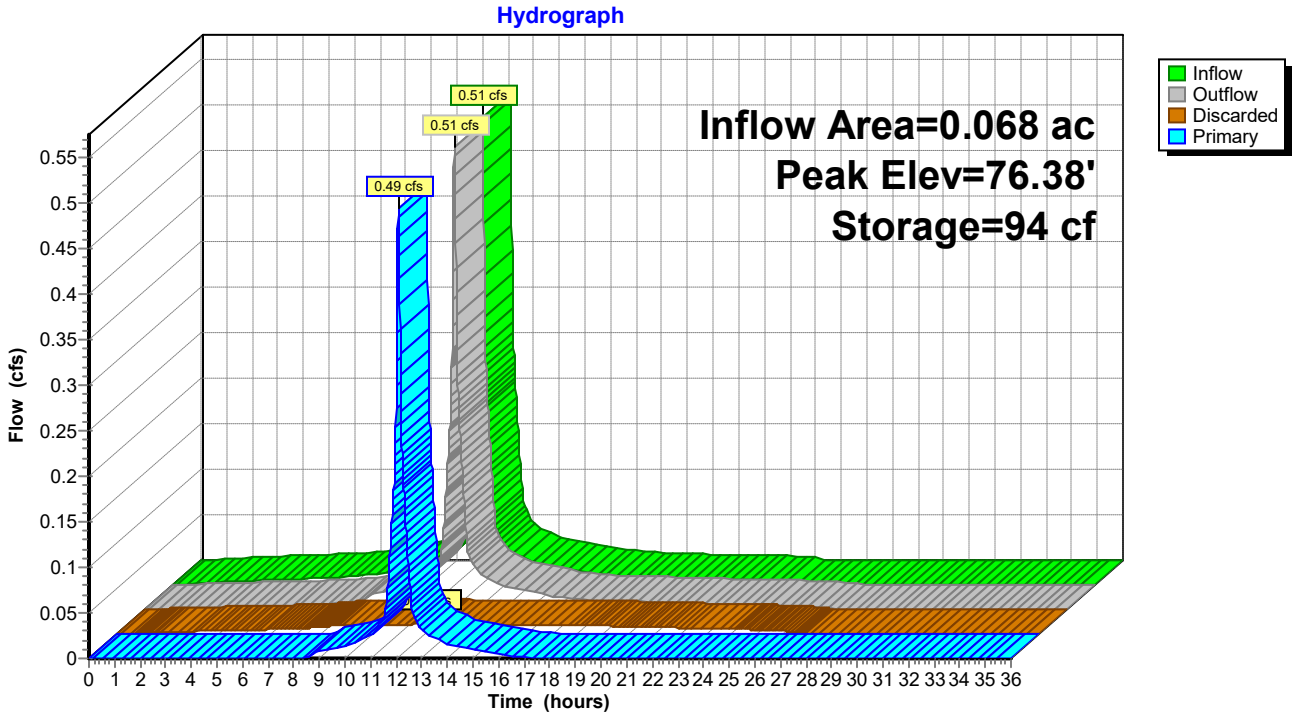
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
75.50	41	32.2	0	0	41
76.10	115	45.3	45	45	125
76.50	312	83.9	82	127	523

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	76.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads
#3	Discarded	75.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=76.38' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.49 cfs @ 12.08 hrs HW=76.38' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.49 cfs of 3.08 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.49 cfs @ 1.19 fps)

Pond 2P: Bioretention Basin



Summary for Pond 3P: Bioretention Basin

Inflow Area = 0.084 ac, 0.00% Impervious, Inflow Depth = 5.15" for 25-year+ event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.036 af
Outflow = 0.36 cfs @ 12.15 hrs, Volume= 0.036 af, Atten= 31%, Lag= 4.6 min
Discarded = 0.01 cfs @ 12.15 hrs, Volume= 0.008 af
Primary = 0.34 cfs @ 12.15 hrs, Volume= 0.028 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 78.26' @ 12.15 hrs Surf.Area= 238 sf Storage= 117 cf

Plug-Flow detention time= 7.2 min calculated for 0.036 af (100% of inflow)
Center-of-Mass det. time= 7.2 min (811.6 - 804.5)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	181 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
77.50	70	56.2	0	0	70
77.90	163	68.7	45	45	197
78.50	296	80.0	136	181	338

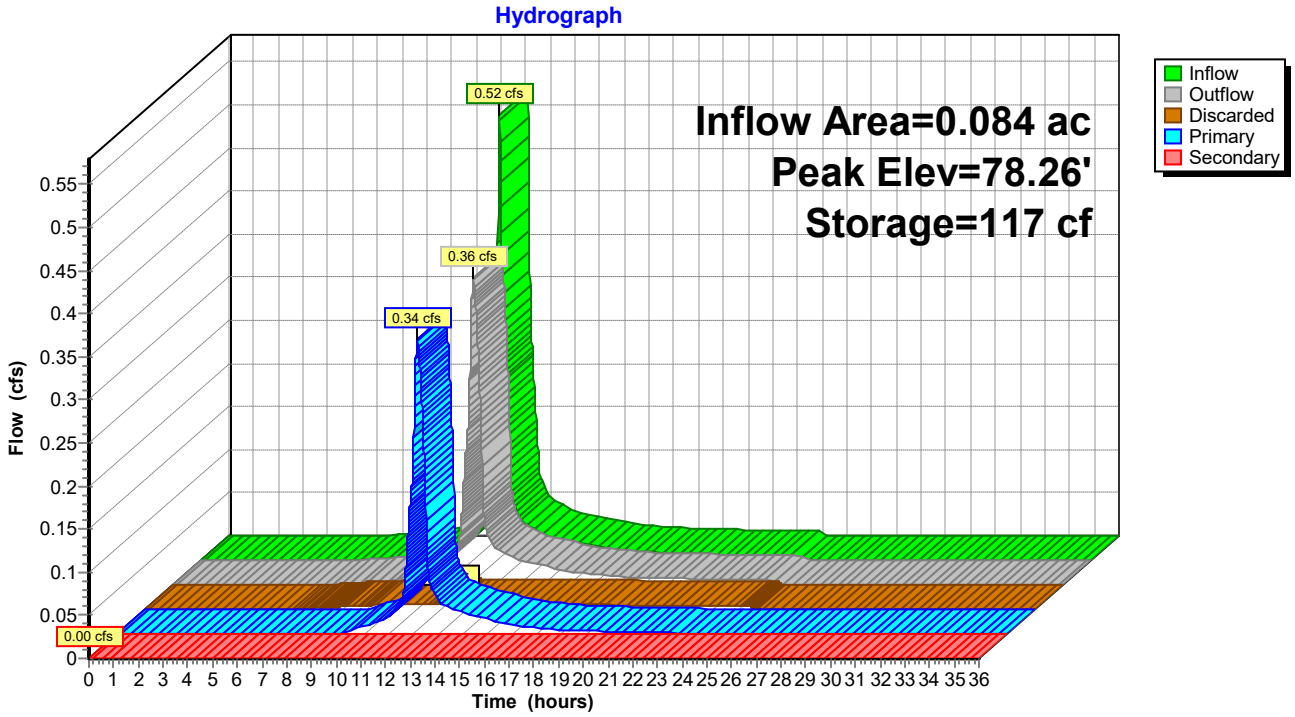
Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	77.60'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	78.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.40'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#5	Discarded	77.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.15 hrs HW=78.26' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.34 cfs @ 12.15 hrs HW=78.26' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.34 cfs of 6.03 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.34 cfs @ 3.91 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=77.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Bioretention Basin

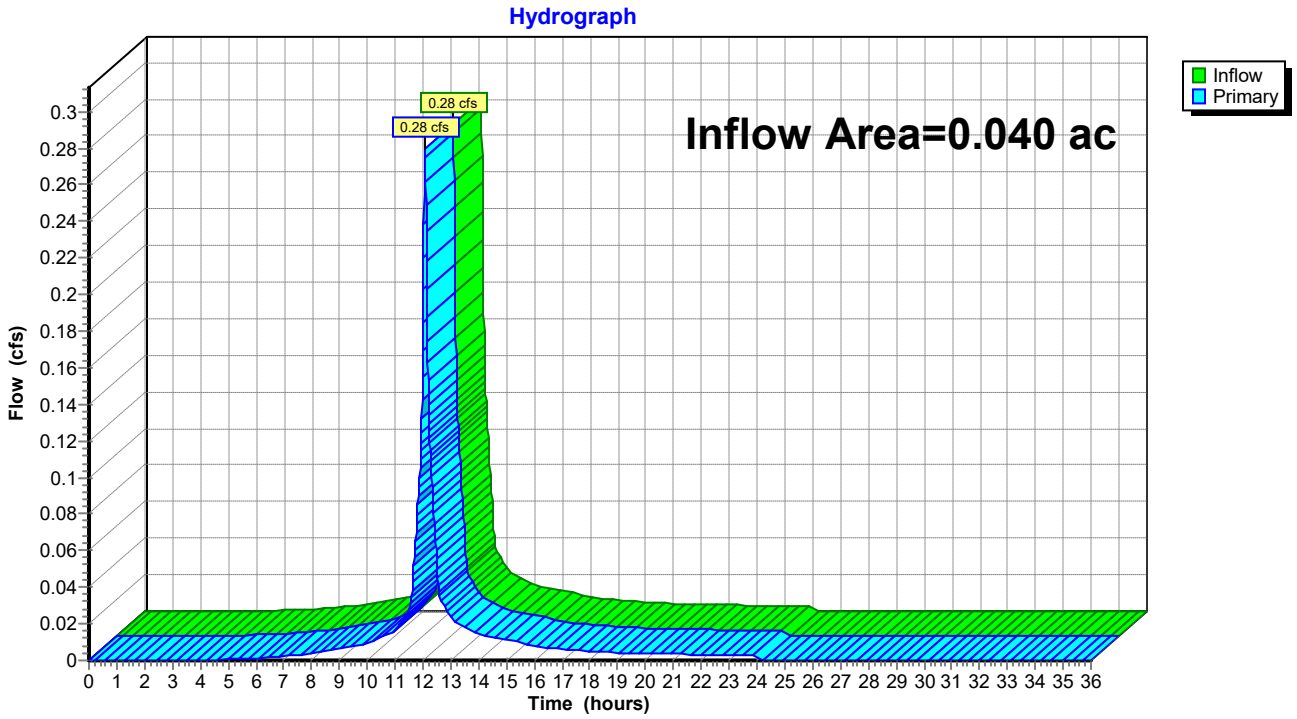


Summary for Link DP-1: Dudley Street

Inflow Area = 0.040 ac, 36.28% Impervious, Inflow Depth = 5.95" for 25-year+ event
Inflow = 0.28 cfs @ 12.07 hrs, Volume= 0.020 af
Primary = 0.28 cfs @ 12.07 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

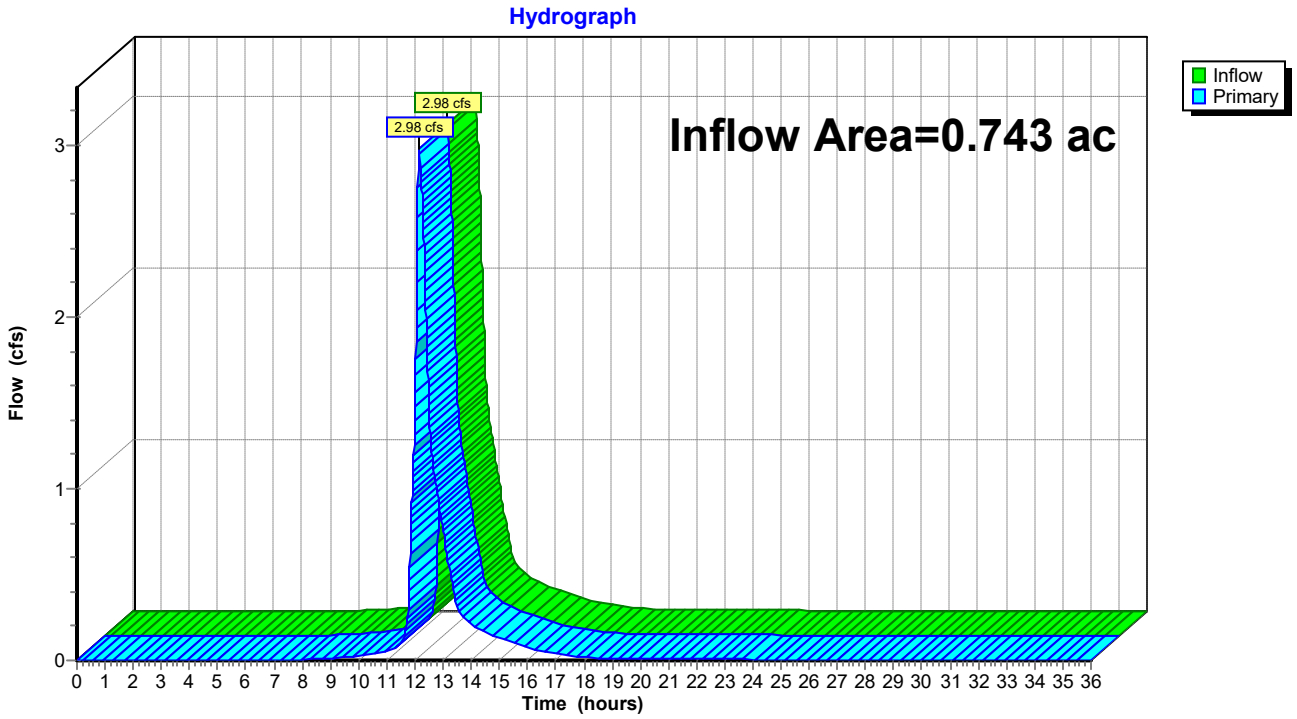


Summary for Link DP-2: Mill Brook

Inflow Area = 0.743 ac, 74.86% Impervious, Inflow Depth = 3.78" for 25-year+ event
Inflow = 2.98 cfs @ 12.15 hrs, Volume= 0.234 af
Primary = 2.98 cfs @ 12.15 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



100-Year Storm Event – Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Roof Runoff Area=0.480 ac 100.00% Impervious Runoff Depth=10.11"
Tc=5.0 min CN=98 Runoff=5.06 cfs 0.405 af

Subcatchment PR-2a: Subcat PR-2a Runoff Area=0.084 ac 0.00% Impervious Runoff Depth=7.86"
Tc=5.0 min CN=80 Runoff=0.78 cfs 0.055 af

Subcatchment PR-2b: Subcat PR-2b Runoff Area=0.105 ac 1.89% Impervious Runoff Depth=7.86"
Tc=5.0 min CN=80 Runoff=0.97 cfs 0.069 af

Subcatchment PR-3: Pavement Runoff Area=0.006 ac 100.00% Impervious Runoff Depth=10.11"
Tc=5.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment PR-4: Pavement Runoff Area=0.068 ac 100.00% Impervious Runoff Depth=10.11"
Tc=5.0 min CN=98 Runoff=0.71 cfs 0.057 af

Subcatchment PR-5: Front of Site Runoff Area=0.040 ac 36.28% Impervious Runoff Depth=8.75"
Tc=5.0 min CN=87 Runoff=0.40 cfs 0.029 af

Pond 1P: Underground Detention MC 4500 Peak Elev=75.92' Storage=5,252 cf Inflow=5.81 cfs 0.449 af
Discarded=0.07 cfs 0.176 af Primary=3.46 cfs 0.273 af Outflow=3.54 cfs 0.449 af

Pond 2P: Bioretention Basin Peak Elev=76.41' Storage=103 cf Inflow=0.71 cfs 0.057 af
Discarded=0.01 cfs 0.018 af Primary=0.69 cfs 0.039 af Outflow=0.70 cfs 0.057 af

Pond 3P: Bioretention Basin Peak Elev=78.44' Storage=164 cf Inflow=0.78 cfs 0.055 af
Discarded=0.02 cfs 0.008 af Primary=0.54 cfs 0.045 af Secondary=0.19 cfs 0.001 af Outflow=0.74 cfs 0.055 af

Link DP-1: Dudley Street Inflow=0.40 cfs 0.029 af
Primary=0.40 cfs 0.029 af

Link DP-2: Mill Brook Inflow=4.79 cfs 0.388 af
Primary=4.79 cfs 0.388 af

Total Runoff Area = 0.783 ac Runoff Volume = 0.620 af Average Runoff Depth = 9.50"
27.13% Pervious = 0.212 ac 72.87% Impervious = 0.571 ac

Summary for Subcatchment PR-1: Roof

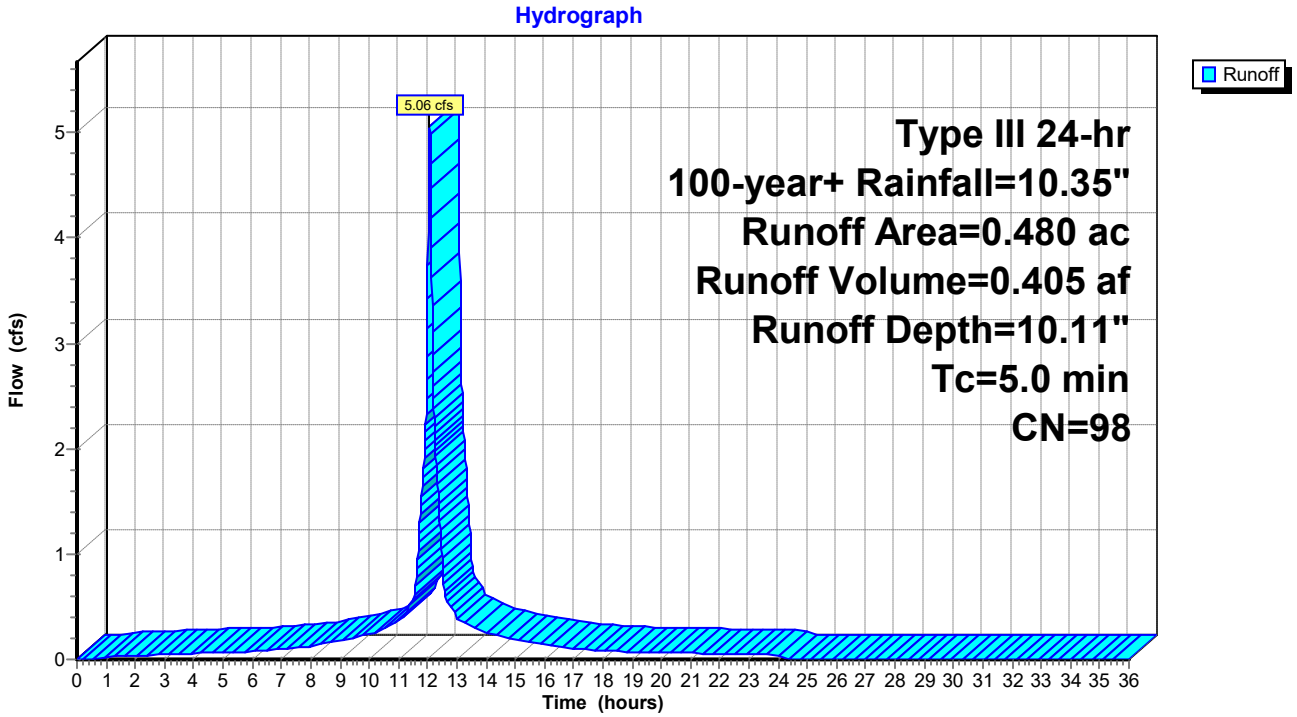
Runoff = 5.06 cfs @ 12.07 hrs, Volume= 0.405 af, Depth=10.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.480	98	Roofs, HSG D
0.480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-1: Roof



Summary for Subcatchment PR-2a: Subcat PR-2a

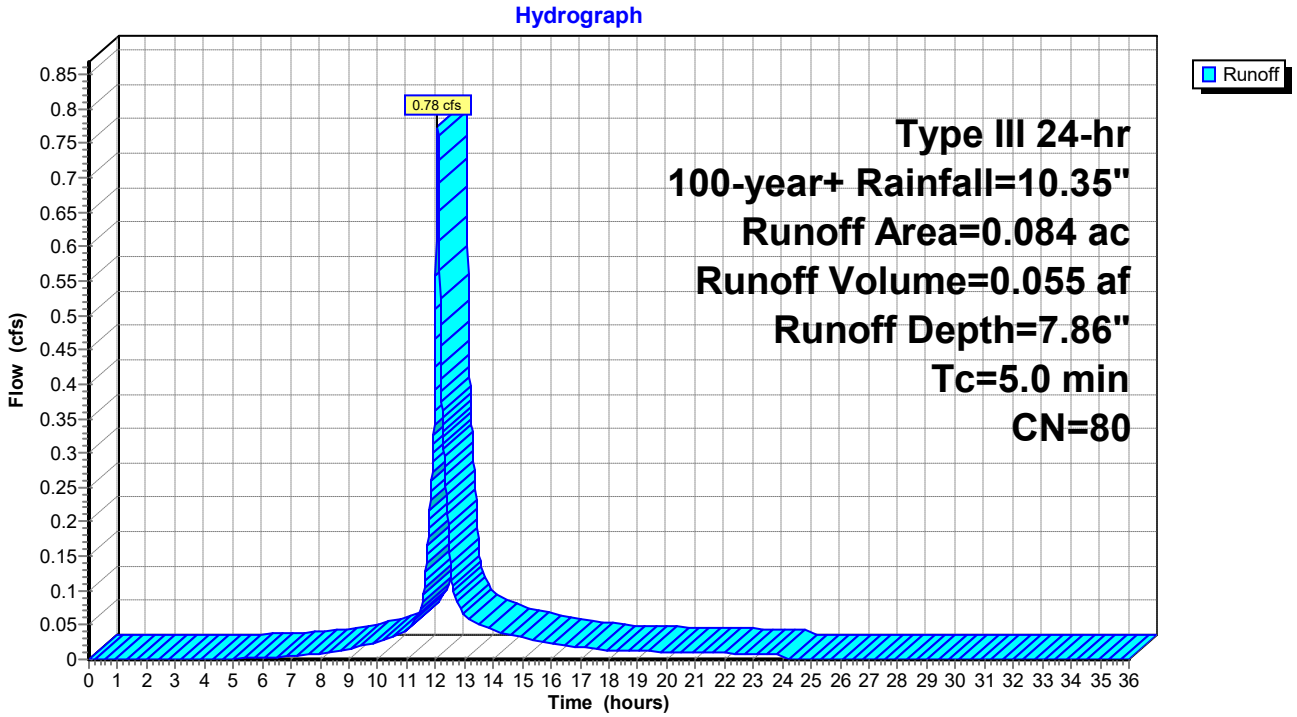
Runoff = 0.78 cfs @ 12.07 hrs, Volume= 0.055 af, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.084	80	>75% Grass cover, Good, HSG D
0.084		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2a: Subcat PR-2a



Summary for Subcatchment PR-2b: Subcat PR-2b

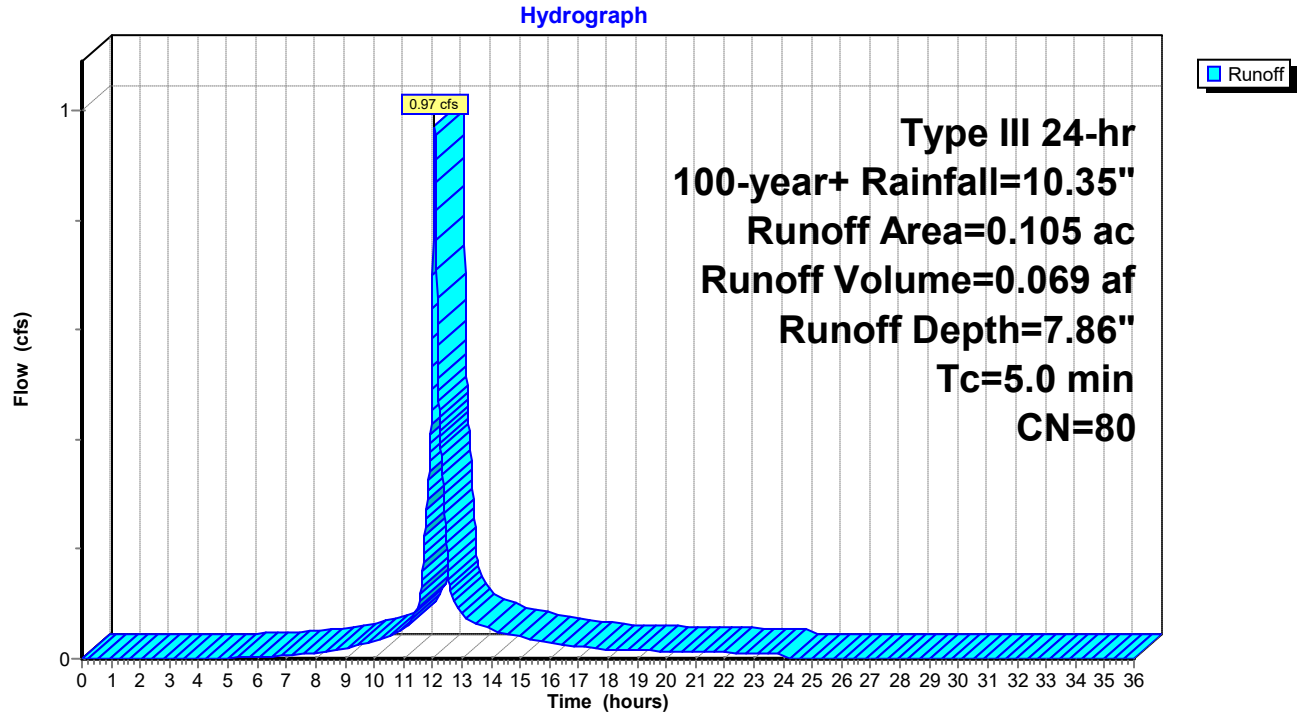
Runoff = 0.97 cfs @ 12.07 hrs, Volume= 0.069 af, Depth= 7.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.103	80	>75% Grass cover, Good, HSG D
0.002	98	Paved parking, HSG D
0.105	80	Weighted Average
0.103		98.11% Pervious Area
0.002		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-2b: Subcat PR-2b



Summary for Subcatchment PR-3: Pavement

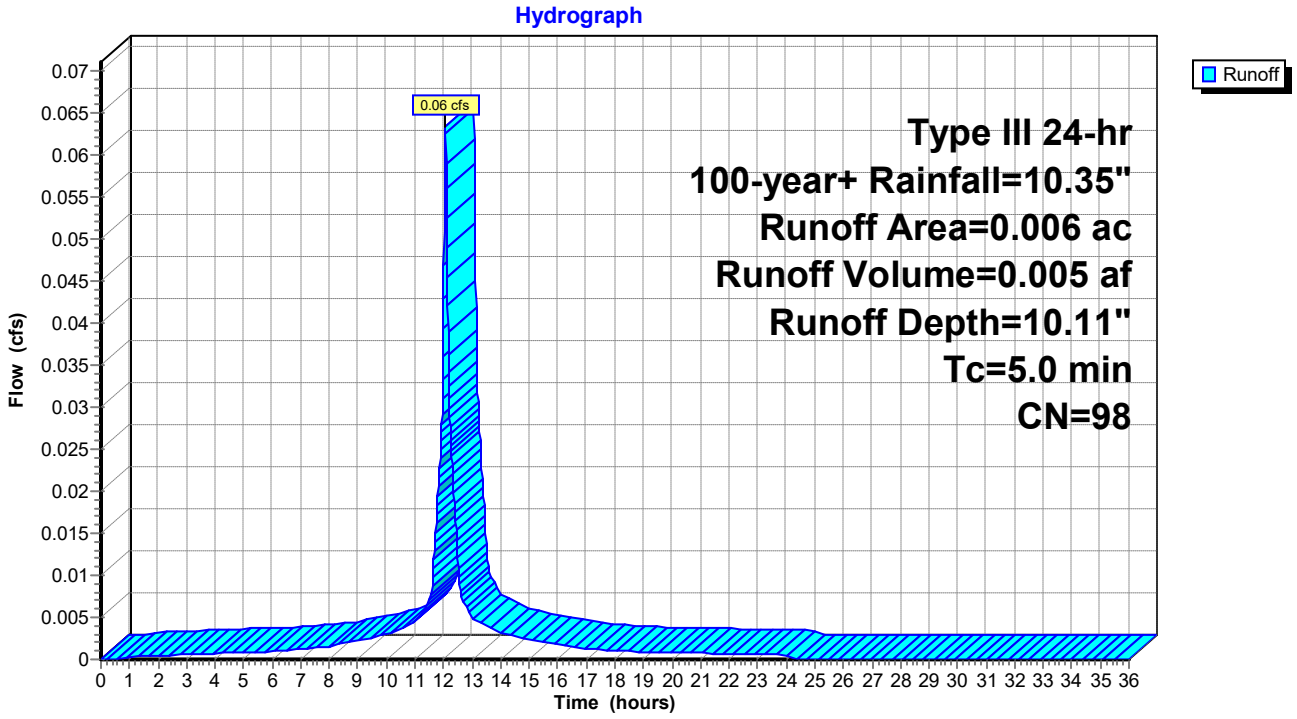
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.005 af, Depth=10.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.006	98	Paved parking, HSG D
0.006		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-3: Pavement



Summary for Subcatchment PR-4: Pavement

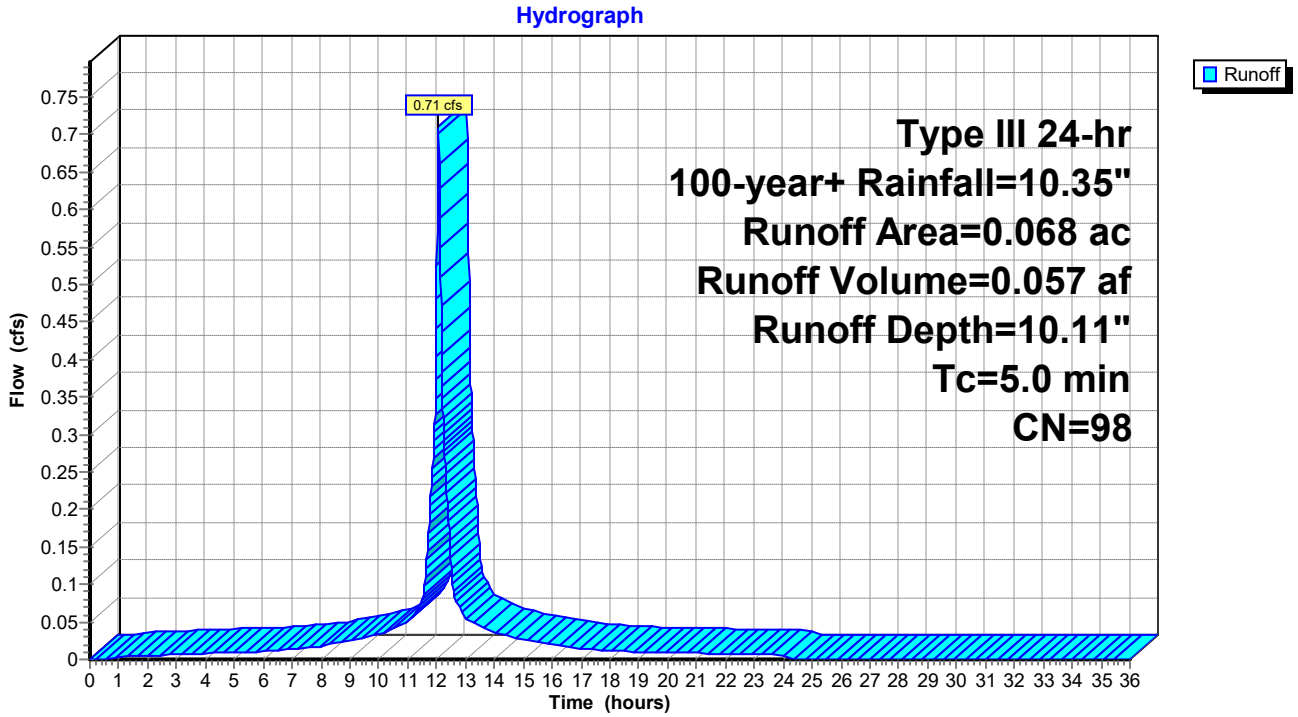
Runoff = 0.71 cfs @ 12.07 hrs, Volume= 0.057 af, Depth=10.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.068	98	Paved parking, HSG D
0.068		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-4: Pavement



Summary for Subcatchment PR-5: Front of Site

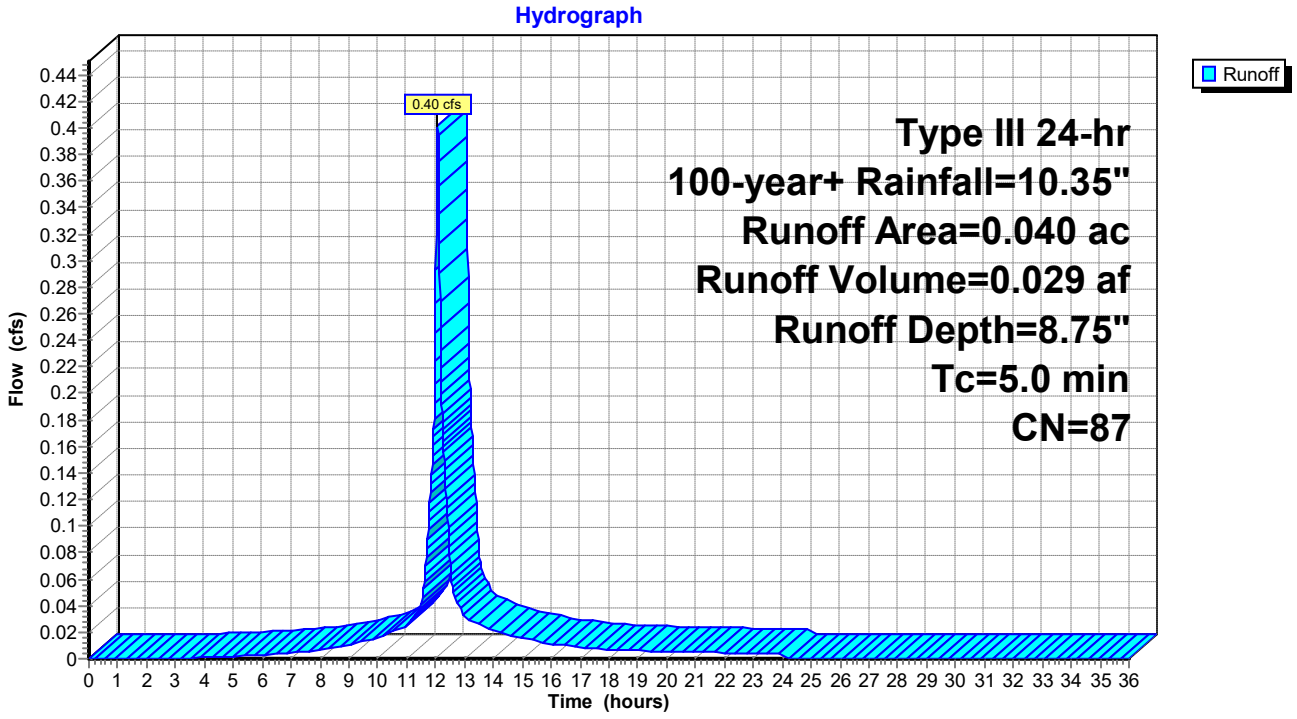
Runoff = 0.40 cfs @ 12.07 hrs, Volume= 0.029 af, Depth= 8.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year+ Rainfall=10.35"

Area (ac)	CN	Description
0.026	80	>75% Grass cover, Good, HSG D
0.015	98	Paved parking, HSG D
0.040	87	Weighted Average
0.026		63.72% Pervious Area
0.015		36.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment PR-5: Front of Site



Summary for Pond 1P: Underground Detention MC 4500

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 3.92'

Inflow Area = 0.554 ac,100.00% Impervious, Inflow Depth = 9.73" for 100-year+ event
Inflow = 5.81 cfs @ 12.07 hrs, Volume= 0.449 af
Outflow = 3.54 cfs @ 12.16 hrs, Volume= 0.449 af, Atten= 39%, Lag= 5.5 min
Discarded = 0.07 cfs @ 5.93 hrs, Volume= 0.176 af
Primary = 3.46 cfs @ 12.16 hrs, Volume= 0.273 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 75.92' @ 12.16 hrs Surf.Area= 1,341 sf Storage= 5,252 cf

Plug-Flow detention time= 128.4 min calculated for 0.449 af (100% of inflow)
Center-of-Mass det. time= 128.4 min (865.0 - 736.7)

Volume	Invert	Avail.Storage	Storage Description
#1	69.10'	2,691 cf	**Custom Stage Data (Irregular)** Listed below 9,387 cf Overall - 2,659 cf Embedded = 6,728 cf x 40.0% Voids
#2	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#3	69.85'	824 cf	**ADS_StormTech MC-4500 b +Cap** x 7 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#4	69.85'	611 cf	**ADS_StormTech MC-4500 b +Cap** x 5 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
#5	69.85'	398 cf	**ADS_StormTech MC-4500 b +Cap** x 3 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +39.5 cf x 2 x 1 rows = 79.0 cf
		5,350 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
69.10	1,341	158.4	0	0	1,341
76.10	1,341	158.4	9,387	9,387	2,450

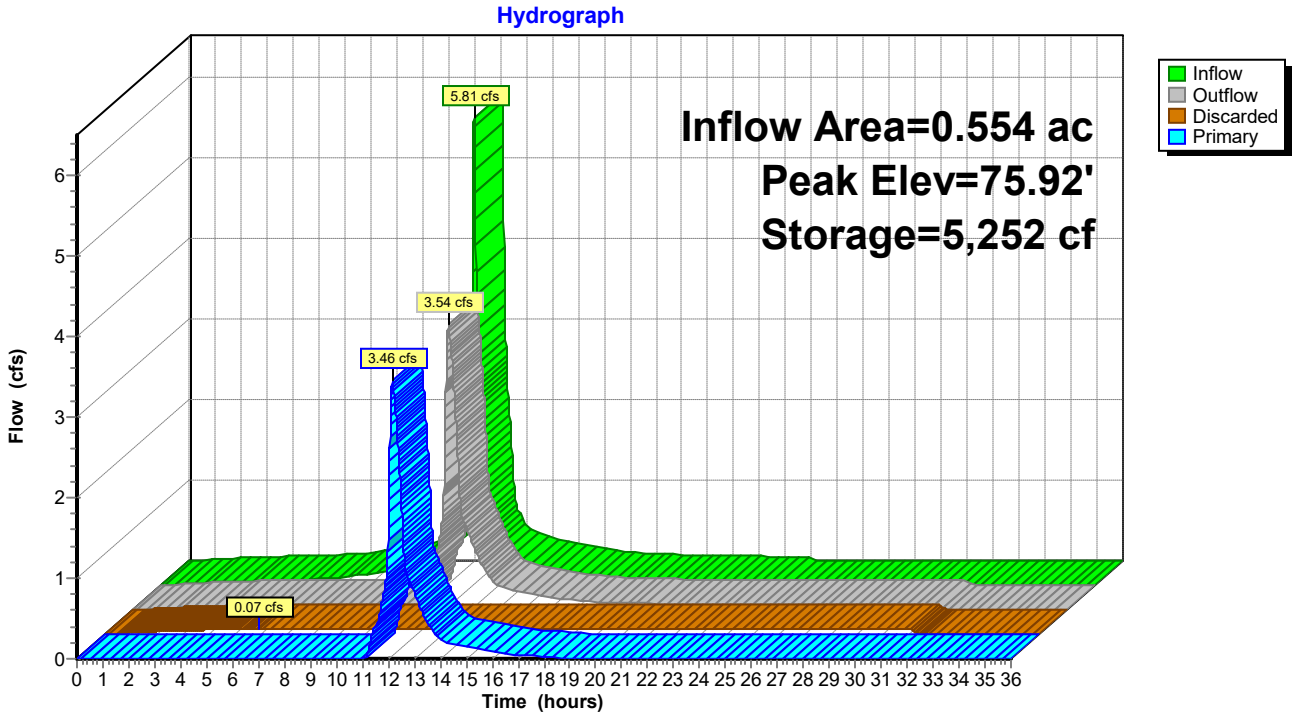
Device	Routing	Invert	Outlet Devices
#1	Primary	71.70'	**12.0" Round Culvert** L= 15.8' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 71.70' / 71.60' S= 0.0063 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	71.70'	**6.5" W x 4.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	73.40'	**5.5" W x 6.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#4	Device 1	75.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Discarded	69.10'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 5.93 hrs HW=69.17' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=3.43 cfs @ 12.16 hrs HW=75.91' (Free Discharge)
└**1=Culvert** (Passes 3.43 cfs of 7.29 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 1.75 cfs @ 9.69 fps)
  └**3=Orifice/Grate** (Orifice Controls 1.66 cfs @ 7.24 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.40 fps)

Pond 1P: Underground Detention MC 4500



Summary for Pond 2P: Bioretention Basin

Inflow Area = 0.068 ac,100.00% Impervious, Inflow Depth = 10.11" for 100-year+ event
Inflow = 0.71 cfs @ 12.07 hrs, Volume= 0.057 af
Outflow = 0.70 cfs @ 12.08 hrs, Volume= 0.057 af, Atten= 1%, Lag= 0.7 min
Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.018 af
Primary = 0.69 cfs @ 12.08 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 76.41' @ 12.08 hrs Surf.Area= 262 sf Storage= 103 cf

Plug-Flow detention time= 33.3 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 33.4 min (770.7 - 737.3)

Volume	Invert	Avail.Storage	Storage Description
#1	75.50'	127 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

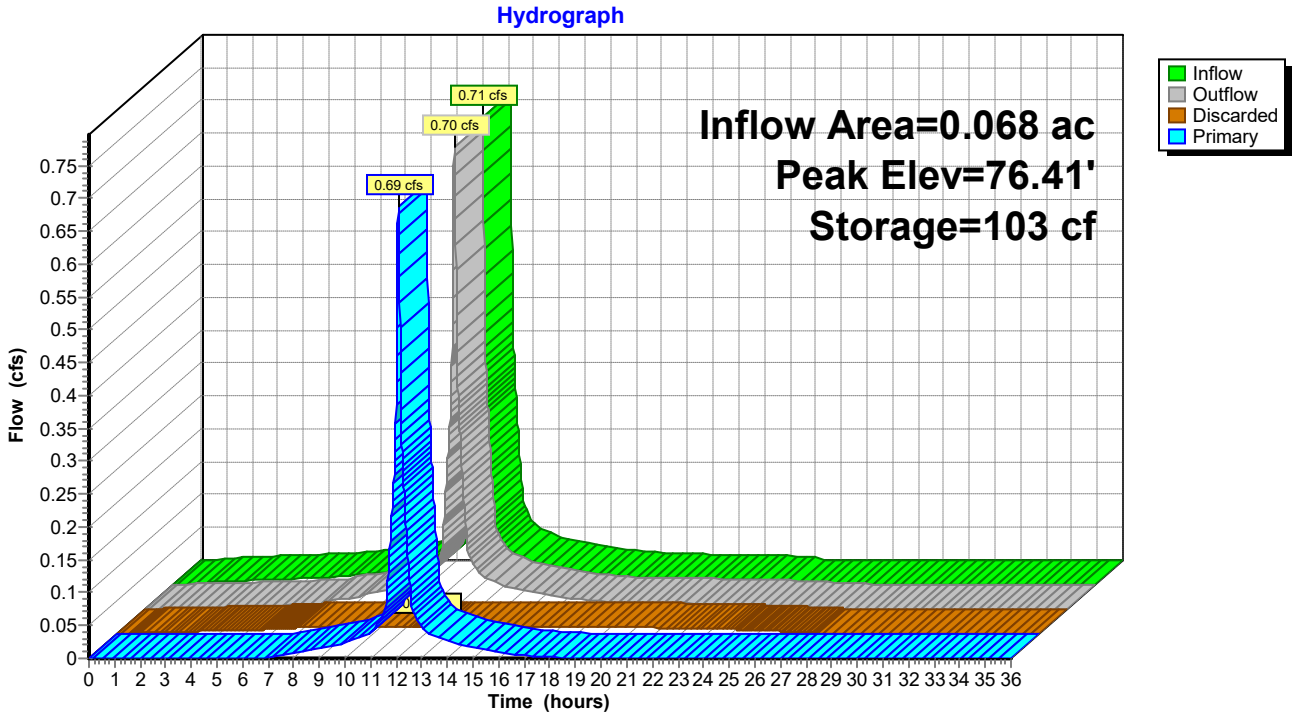
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
75.50	41	32.2	0	0	41
76.10	115	45.3	45	45	125
76.50	312	83.9	82	127	523

Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	76.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 in 12.0" Grate (100% open area) Limited to weir flow at low heads
#3	Discarded	75.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=76.41' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.69 cfs @ 12.08 hrs HW=76.41' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.69 cfs of 3.15 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.69 cfs @ 1.33 fps)

Pond 2P: Bioretention Basin



Summary for Pond 3P: Bioretention Basin

Inflow Area = 0.084 ac, 0.00% Impervious, Inflow Depth = 7.86" for 100-year+ event
Inflow = 0.78 cfs @ 12.07 hrs, Volume= 0.055 af
Outflow = 0.74 cfs @ 12.10 hrs, Volume= 0.055 af, Atten= 5%, Lag= 1.5 min
Discarded = 0.02 cfs @ 12.10 hrs, Volume= 0.008 af
Primary = 0.54 cfs @ 12.10 hrs, Volume= 0.045 af
Secondary = 0.19 cfs @ 12.10 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 78.44' @ 12.10 hrs Surf.Area= 281 sf Storage= 164 cf

Plug-Flow detention time= 6.1 min calculated for 0.055 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (798.7 - 792.7)

Volume	Invert	Avail.Storage	Storage Description
#1	77.50'	181 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
77.50	70	56.2	0	0	70
77.90	163	68.7	45	45	197
78.50	296	80.0	136	181	338

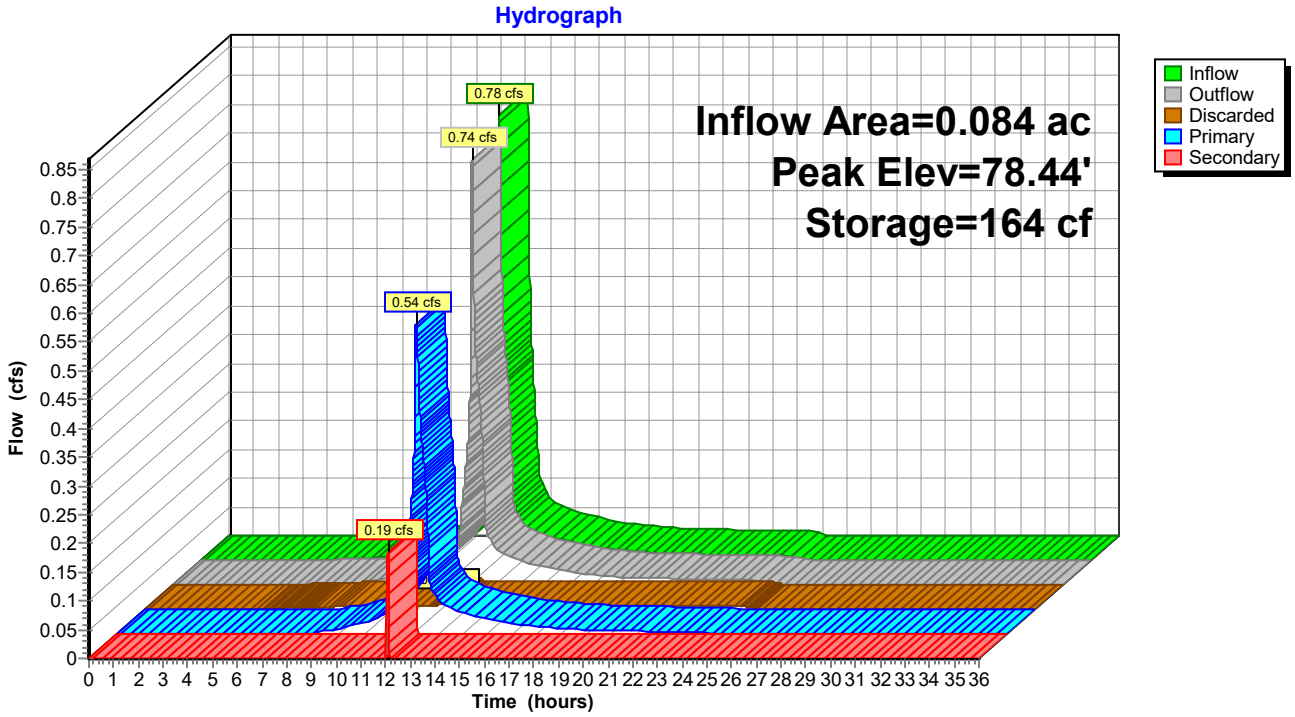
Device	Routing	Invert	Outlet Devices
#1	Primary	72.00'	**12.0" Round Culvert** L= 15.9' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.50' S= 0.0314 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	77.60'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	78.25'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.40'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#5	Discarded	77.50'	**2.400 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.10 hrs HW=78.44' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.54 cfs @ 12.10 hrs HW=78.44' TW=75.72' (Fixed TW Elev= 75.72')
└**1=Culvert** (Passes 0.54 cfs of 6.24 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.38 cfs @ 4.41 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.48 fps)

Secondary OutFlow Max=0.18 cfs @ 12.10 hrs HW=78.44' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.18 cfs @ 0.46 fps)

Pond 3P: Bioretention Basin

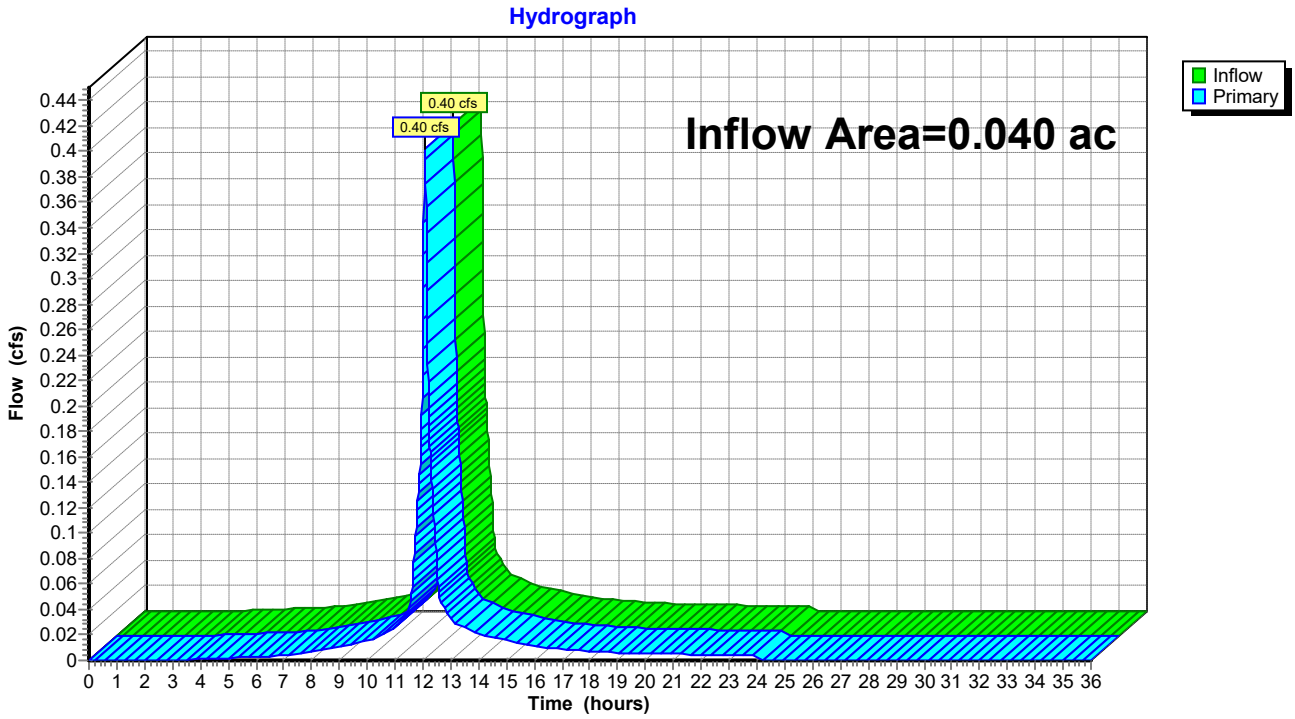


Summary for Link DP-1: Dudley Street

Inflow Area = 0.040 ac, 36.28% Impervious, Inflow Depth = 8.75" for 100-year+ event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 0.029 af
Primary = 0.40 cfs @ 12.07 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-1: Dudley Street

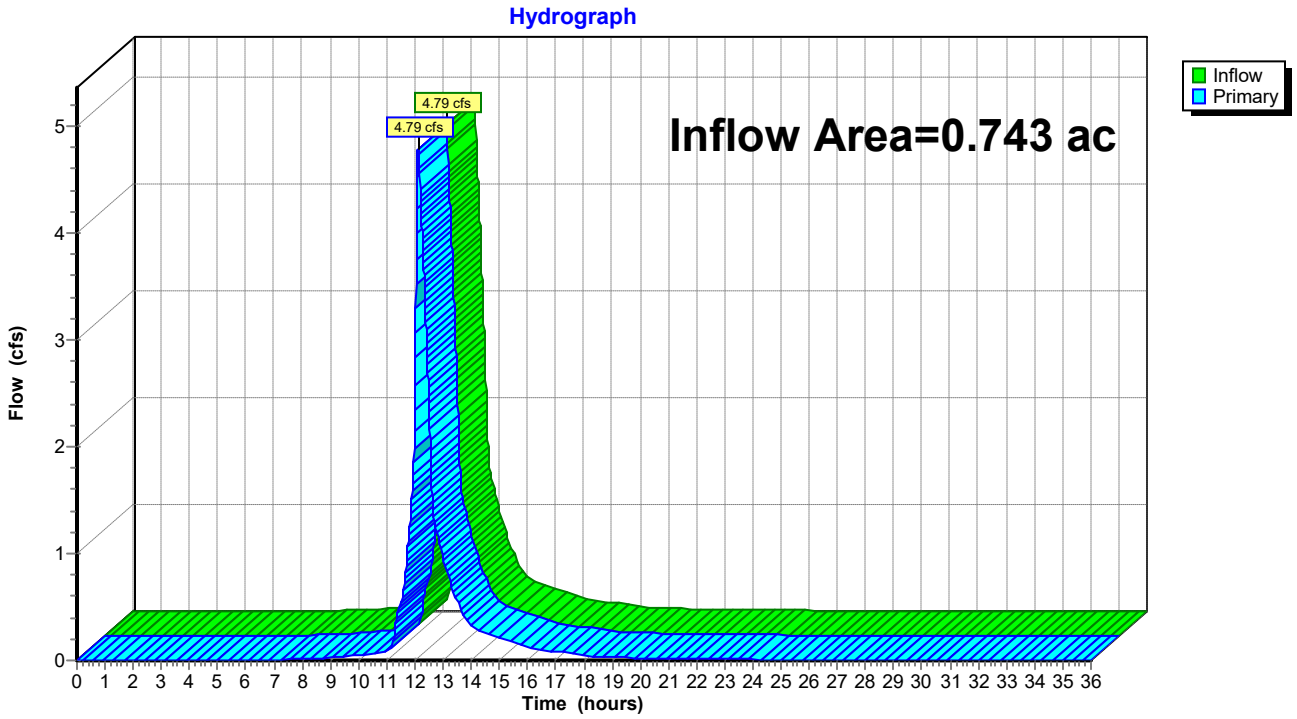


Summary for Link DP-2: Mill Brook

Inflow Area = 0.743 ac, 74.86% Impervious, Inflow Depth = 6.27" for 100-year+ event
Inflow = 4.79 cfs @ 12.11 hrs, Volume= 0.388 af
Primary = 4.79 cfs @ 12.11 hrs, Volume= 0.388 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP-2: Mill Brook



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Appendix C: Standard 3 Computations and Supporting Documentation

- Geotechnical Report (GeoEngineers Inc., dated January 28, 2022)
- Recharge Volume Calculations
- 72 hour drawdown analysis

Geotechnical Report

GeoEngineers USA
239 Causeway Street, Suite 105
Boston, Massachusetts 02114
617.749.9214

January 28, 2022

PSI Atlantic Arlington Massachusetts LLC
530 Oak Court Drive, Suite 155
Memphis, Tennessee 38117

Attention: Jay Tillman and Jesse Morgan

Subject: Geotechnical Engineering Letter Report
34 Dudley Street
Arlington, Massachusetts
File No. 25754-001-00

GeoEngineers USA, PC (GeoEngineers) is pleased to provide this geotechnical engineering letter report to PSI Atlantic Arlington MA, LLC (PSI) for the proposed redevelopment for the property located at 34 Dudley Street in Arlington, Massachusetts (Site), as shown on Figure 1, Site Locus Map. This letter report is subject to the limitations attached herein.

SITE AND PROJECT DESCRIPTION

The existing site is comprised of a one to two story autobody shop and glass repair shop with a one-story garage located in the southwestern portion of the site and associated paved parking areas. As shown on Figure 2, Exploration Location Plan, the southern portion of the site slopes down to Mill Brook. GeoEngineers observed that portions of the slope have failed or are in poor condition.

Based on our conversations with you and the concept plans provided by VHB, Inc. (VHB), dated November 3, 2021, we understand the project consists of razing the existing structure to allow for the construction of a 5-story self-storage facility with a footprint of approximately 20,000 square feet and associated parking areas and drive aisles. Based on the grading plan we received on January 25, 2022, we understand the building will have a proposed finished floor elevation (FFE) of elevation (El.) 79 feet and will be constructed at-grade without a basement. The site plans indicate that the upper portion of the slope along Mill Brook will be re-graded as part of the redevelopment. A stormwater infiltration system with a bottom of stone invert of El. 69.1 feet is also proposed in the northwestern portion of the Site, as shown on Figure 2.

Existing grades at the site vary between approximately El. 76 feet at the crest of the southern slope by Mill Brook and approximately El. 81 feet in the upper parking lot in the northern portion of the Site. Ground surface elevations in this memorandum are referenced to the North American Vertical Datum of 1988 (NAVD) and elevations are based on interpreting the existing conditions plans by VHB dated October 28, 2021.

SUBSURFACE EXPLORATION PROGRAM

The subsurface exploration program consisted of advancing six borings to depths between approximately 7 to 25 feet below existing ground surface (bgs). The boring program was completed between December 9, 2021, and January 8, 2022. The boring program was designed to meet the intent of the Town of Arlington zoning bylaw for redevelopments residing in the Inland Wetland District (Section 5.8.6 Development Conditions – subsection A.1). In addition, explorations were coordinated with the project environmental consultant, The Vertex Companies (Vertex) of Boston, Massachusetts as part of their Phase I Environmental Site Assessment (ESA). The approximate locations of the explorations are shown on Figure 2 and logs are provided in Attachment A.

Borings were advanced by Crawford Drilling Services, LLC (CDS) of Westminster, Massachusetts on December 18, 2021 using a truck-mounted drill rig equipped with hollow-stem augers and by G&M Subsurface on December 9, 2021 and January 8, 2022 using direct-push drilling methods. The boring programs were continuously observed by a representative from GeoEngineers who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions (if present) and prepared a detailed log of each exploration. Soil samples were collected at 5-foot intervals with a 2-inch outside-diameter split-barrel standard penetration test (SPT) sampler. The blow counts are shown on the boring logs at the respective sample depths.

Soils encountered in the borings were visually classified in general accordance with the classification system described in Figure A-1. A key to the boring log symbols is also presented in Figure A-1. The logs of the borings are presented in Figures A-2 through A-7. The boring logs are based on our interpretation of the field and laboratory data and indicate the various types of soils encountered. The logs also indicate the depths at which these soils or their characteristics change, although the changes may actually be gradual. If the change occurred between samples, it was interpreted. The densities noted on the boring logs are based on the blow count data obtained in the borings and judgment based on the conditions encountered.

Geotechnical Laboratory Analysis

Three soil samples, from borings designated GEO-3, GEO-5, and GEO-6, were submitted to Thielsch Engineering of Braintree, Massachusetts by GeoEngineers for geotechnical laboratory testing to obtain index properties. Analyses included grain-size with hydrometer testing to confirm United States Department of Agriculture (USDA) textural classification for Rawls Rate correlations to support preliminary stormwater management design. The samples were selected to represent potential receiving layers within areas of the Site that are anticipated to receive stormwater. Results of the laboratory analysis are provided in Attachment B.

SUBSURFACE CONDITIONS

In general, the soil conditions observed at the Site consist of surface treatments (asphalt) underlain by fill overlying natural granular soils.

The existing fill consists of fine to coarse sand with varying gravel and silt content. Various non-soil constituents, consistent with historic (urban) fill, such as brick, asphalt, glass, and ash particles were observed within the fill layer.

The natural soil deposit is a glacial outwash deposit, consisting of dense to very dense sand with varying amounts of coarse gravel and silt. Coarse gravel and frequent cobbles were persistent throughout the outwash deposit and resulted in frequent auger and direct push refusal between 7 and 25 feet bgs. Cobbles and/or boulders should be expected during excavation of the materials during construction.

Groundwater

Groundwater was observed to be between approximately 15 and 24 feet bgs in the existing wells installed by others, designated MW-1 through MW-3, as indicated in Figure 2. The depths to groundwater shown on Figure 2 are based on measurements by Vertex on December 18, 2021. Installation logs and records of these monitoring wells were not available to us at the time of this letter report.

Groundwater is anticipated to flow southwards, from Dudley Street towards Mill Brook to the south of the Site. It should be noted that groundwater levels will vary depending on seasonal variations in temperature and precipitation and can also be influenced by subsurface utilities, construction development and other factors.

ENVIRONMENTAL CONSIDERATIONS

Please refer to the environmental reports prepared by Vertex regarding any provisions for soil and/or groundwater management during demolition and construction.

GEOTECHNICAL ENGINEERING RECOMMENDATIONS

The paragraphs below provide our geotechnical recommendations for building foundations and site work.

STORMWATER MANAGEMENT DESIGN RECOMMENDATIONS

Based on the subsurface conditions observed in the test borings at the Site, we anticipate the subsurface conditions below the proposed stormwater management to be generally consistent with subsurface conditions encountered in borings GEO-3 and GEO-5, with the exception that there may be a thicker fill layer as the existing building currently resides over the future stormwater management area. We recommend that the future stormwater management area be constructed such that the existing fill material is removed and the natural sand be used as the receiving layer for stormwater infiltration.

Based on grain-size analysis results, we recommend the receiving layer soil be classified as sand and loamy sand based on the USDA soil classification system. These soils are classified by the Hydrologic Soil Group (HSG) A and correlate to Rawls Rates between 2.41 and 8.27 inches per hour. The laboratory results are in the table below. We recommend VHB select the appropriate design value based on the depth of the stormwater management area and their engineering judgement.

Boring ID	Sample Depth (ft)	USDA Classification	Rawls Rate (in/hr)
GEO-3W	5-12	Loamy Sand	2.41
GEO-5W	9-10.8	Loamy Sand	2.41
GEO-6W	5.3-6	Sand	8.27

Note:
Rawls Rates taken from Table 2.3.3 “1982 Rawls Rates” from the Massachusetts Stormwater Handbook Volume 3 Chapter 1.

Evidence of Estimated Seasonal High Groundwater (ESHGW) was not observed during drilling. Based on observations during test borings and measured groundwater data, it is our opinion that ESHGW for the site is greater than 10 feet below ground surface and is not located within 4 feet of the bottom of the proposed stormwater infiltration system.

GEOTECHNICAL DESIGN RECOMMENDATIONS

Below is a summary of the primary geotechnical considerations associated with design and redevelopment of the Site:

- The proposed buildings can be supported by conventional shallow, spread footings and a slab-on-grade.
- The spread footings should bear directly on natural, inorganic, granular soils or on compacted structural fill bearing directly on natural, inorganic, granular soils. Footings should not bear directly on fill material. As such, over-excavation and replacement of the existing fill material will be necessary as specified herein. Over-excavation could extend from approximately 2 to 8 feet below existing grade.
- The top two (2) feet of fill below the slab should be excavated and replaced and recompacted prior to placing base course. The fill that is present and extends more than 2 feet below finished grade may remain in place provided is compacted as specified herein.
- Fill material below future pavement areas may remain in place provided it is proof-compacted as specified herein. Existing foundations, slabs, concrete, asphalt, utilities, and any remnants of the existing development should be removed in their entirety below building areas.
- We anticipate the inorganic, granular, on-site fill can be re-used as backfill outside of building areas provided it is placed and compacted in accordance with project specifications.
- The proximity of the southern building footings to the existing slope have the potential to create slope instability. As such, regrading of that slope to a minimum 2H:1V slope angle should be incorporated into the design considerations. Alternatively, the foundations along the slope edge should be installed deeper than the minimum frost depth.

Foundation Design Criteria

We recommend that the building be supported on shallow spread footings bearing on natural soils or on structural fill placed directly over natural soils. Some over-excavation of the existing fill material will be necessary to expose the top of the natural soils suitable for footing bearing. Fill should be over-excavated from within the zone of influence (ZOI) of the footings to expose the top of the natural soil. The ZOI is defined as a one horizontal to one vertical (1H:1V) line projecting outward and downward from the outside edge of the foundation element.

Allowable Bearing Pressure

For foundations constructed as recommended in this memorandum, we recommend using a net allowable bearing pressure of 2 tons per square foot (TSF) for footings bearing on natural, granular soil, or compacted structural fill bearing on natural soil deposits. The allowable soil bearing pressure applies to the total of dead and long-term live loads.

Foundation Dimensions

The minimum recommended lateral dimension for isolated spread footings is 36 inches, while continuous wall footings should be at least 18 inches wide. Footings in areas exposed to freezing temperatures should be founded at least 4 feet below exterior finished grade for frost protection. Interior footings, in areas not exposed to freezing temperatures, should be at least 24 inches below finished floor grade, or depth that provides at least 12 inches between top of footing and finished floor elevation, whichever is deeper.

Please note that the depth of the footings adjacent to the existing slope may need to be extended deeper to limit the potential for slope instability. Further analysis of this requirement is needed pending final grading and final design of the footing dimensions based on the net allowable bearing capacity provided herein.

Settlement

Provided the footing subgrade is prepared as recommended herein, we estimate that the total post-construction settlement will be less than 1 inch. Differential settlements are estimated to be less than 0.5 inches between adjacent columns but will vary based on live load distribution and column spacing.

Slab on Grade Design Criteria

As stated herein, the top 2 feet of fill material should be excavated, replaced and recompacted prior to placing the base course material. The slab should consist of a soil supported slab-on-grade. The base course layer directly below the slab should consist of 6 inches of MassDOT Item M2.01.7 Dense-graded Crushed Stone. Provided the subgrade soils are prepared as recommended herein, the slab should be designed as a beam on an elastic foundation with modulus of subgrade reaction of 150 pounds per cubic inch (pci).

Existing Fill Material

Based on observations and soil classification, we anticipate that the existing granular fill may be suitable for reuse below pavement areas provided it can be placed and compacted as specified herein.

Slope Rehabilitation Considerations

Given the poor condition of the existing slope, we recommend that the south-facing slope along Mill Brook be re-graded to a minimum 2H:1V slope angle as part of reconstruction. Rehabilitated slopes should incorporate vegetative development and erosion control barriers to limit runoff and improve slope stability. Once structural column loads and footing sizes are available, we recommend that the slope stability be evaluated.

Earthwork Procedures for Preparation of Building Pad Areas

The following paragraphs describe the recommended earthwork procedures for preparation of the building areas.

- Foundations, utilities, existing concrete, topsoil and pavement, should be removed from the proposed building areas in their entirety.
- The existing fill material should be removed from the zone of influence (ZOI) of the footings in its entirety (to natural soil subgrade). For construction purposes, the ZOI is defined as the area within a line projecting outward and downward from the outside edge of the proposed footing at a 1H:1V (horizontal to vertical) slope. Fill material present in the buildings outside the ZOI may remain in place provided it is prepared as specified below.
- Fill below the proposed slab-on-grade should be excavated by 2 feet, replaced and recompacted as specified herein, provided the onsite fill meets the specifications herein for Structural Fill.
- The excavated site soil may be re-used as backfill provided it meets the requirements for Structural Fill provided herein. The fill should be placed in 12-inch-thick loose lifts and compacted to at least 95 percent of its maximum dry density (MDD) as determined by ASTM International (ASTM) D1557 Method C (modified proctor).

- After removing the existing fill as described above, the surface of the inorganic soils within the building footprint and 5 feet beyond the exterior walls should be proof compacted with at least six passes of a 10-ton vibratory roller (or equivalent effort) under the observation of a qualified geotechnical engineer, or his/her representative. Any soft or loose zones identified by proof compaction should be evaluated by excavation and replaced with compacted Structural Fill as specified herein.
- Temporary cut slopes for the over-excavation of fill material below proposed footings for building foundations should be conducted at a 2H:1V slope to maintain a safe excavation. The footing subgrade (at the bottom of the over-excavation) should be proof compacted, prior to the placement of raise-in-grade fill, with at least six passes of a 1,000-pound vibratory plate compactor.
- For the slab-on-grade, the subgrade should be proof-compacted with at least six passes of a 10,000-pound vibratory roller. Any soft or loose areas identified during proof-compaction should be over-excavated and replaced with Structural Fill as specified herein. The top 6 inches of fill directly below the slab should consist of base course material as specified herein. The fill should be placed in maximum 12-inch-thick loose lifts and compacted to at least 95 percent of its maximum dry density (MDD) as determined by ASTM International (ASTM) D1557 Method C (modified proctor).

Structural Fill

Fill placed to directly below and within the ZOI of foundations, within 5 feet of the bottom of slab elevation, within 5 feet of utilities (bottom and sides), and within 5 feet of finished grade for pavements and sidewalks should consist of Structural Fill as described below:

- Structural Fill used as base course for the building slab should meet the requirements of Dense-Graded Crushed Stone (1½-inch minus crushed stone) or Gravel Borrow – Type B, MASSDOT, Items M2.01.7-1 or M1.03.0 Type B, respectively.
- Structural fill placed as base course below pavements and sidewalks should meet the requirements of Dense-Graded Crushed Stone (1½-inch minus crushed stone - Type B, MASSDOT, Items M2.01.7-1), Gravel Borrow (M1.03.0 - Type B), or Reclaimed Pavement Borrow (M1.09.0-1) in pavement areas only. Reclaimed Pavement Borrow should not be placed within the building footprint.
- Structural Fill placed as backfill of over-excavation below footings and within the ZOI of footings, and as general raise-in-grade fill in non-building areas (below base course) should consist of the following:

Sieve Size	Percent Passing By Weight
4-inch	100
1-inch	70-100
No. 4	30-60
No. 200	0-15

- Structural fill placed within irregularly shaped utility trenches or trenches not accessible to compaction equipment should consist of Controlled Density Fill (CDF) consisting of high slump Portland cement concrete with a compressive strength less than 150 pci at 28 days, otherwise the trench should be backfilled in accordance with the project specifications.
- Structural fill placed to stabilize footing subgrades, if needed, and for the proposed infiltration gallery crushed stone layer should meet the requirements of Crushed Stone (¾-inch crushed gravel), MASSDOT, Item M2.01.4.

Crushed Stone should be compacted with at least six passes of a 1,000-pound vibratory plate compactor, or until visibly firm and stable, as determined by the Geotechnical Engineer, or his/her qualified representative.

Earthwork Procedures for Preparation of Pavement Areas

- In proposed pavement areas, the existing asphalt, topsoil, foundations, slabs, and site utilities should be removed in their entirety. Where existing, deep utilities (>6 feet bgs) are present in proposed parking areas, it is acceptable to completely fill the utility with flowable fill and abandon the utility in-place.
- The exposed subgrade for future parking areas should be proof-compacted with at least six passes of a 10 ton vibratory roller (or equivalent effort) under the observation of a qualified geotechnical engineer, or his/her representative is recommended. Any soft or loose areas identified by the proof-compaction should be removed in their entirety and replaced with Structural Fill as specified herein.
- General raise-in-grade fill in parking areas should consist of Structural Fill and placed and compacted as specified herein.
- Base course for pavement should placed in 12-inch-thick loose lifts and compacted to at least 95 percent of its maximum dry density (MDD) as determined by ASTM International (ASTM) D1557 Method C (modified proctor).

Recommended Pavement Design

Parking area and access drive pavement subgrades should be prepared as specified herein. If soft or loose soils are encountered, such unsuitable subgrade soils should be over-excavated in their entirety and replaced with Structural Fill as specified herein.

Asphalt Concrete Pavement for Parking Areas

The pavement design is intended to strike a balance between performance and cost in consideration of the soil available at the Site and anticipated traffic loads (passenger vehicles). We recommend the following (minimum) flexible pavement cross-sections for both standard and heavy-duty applications.

Layer	Standard Duty	Heavy Duty
	Thickness	
Asphalt Wearing Course (MassDOT Item M3.11.03)	1.5 inches	1.5 inches
Asphalt Binder Course (MassDOT Item M3.11.03)	1.5 inches	2.5 inches
Pavement Base Course (Reclaimed Pavement Borrow, MassDOT Item M1.09.0, or Dense-Graded Crushed Stone, MassDOT Item M2.01.7)	9 inches	9 inches

LIMITATIONS

We have prepared this preliminary design memorandum for the exclusive use of PSI Atlantic Arlington MA, LLC and their authorized agents for 34 Dudley Street in Arlington, Massachusetts.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this memorandum was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix C, "Design Memorandum Limitations and Guidelines for Use" for additional information pertaining to use of this memorandum.

Sincerely,
GeoEngineers, Inc.

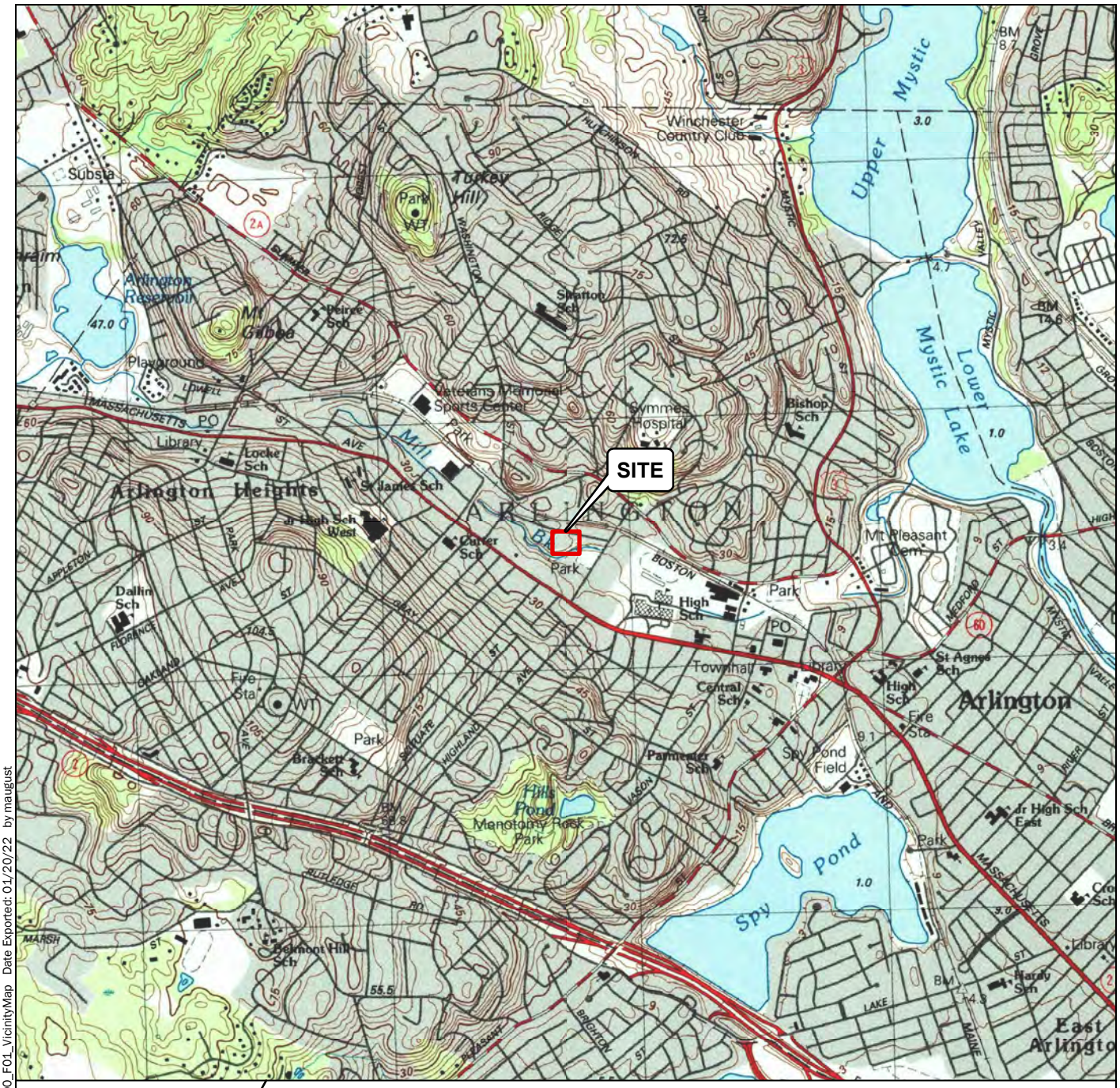
Mark N. Ruberti, PE
Geotechnical Engineer (MA)

Stan S. Sadkowski, PE
Principal Geotechnical Engineer (MA)

MNR:SSS:kab

Attachments:
Figure 1. Site Locus Map
Figure 2. Exploration Location Plan
Appendices:
Appendix A. Boring Logs
  Figure A-1. Key to Exploration Logs
  Figures A-2 through A-7. Logs of Borings
Appendix B. Laboratory Testing Data Sheet
  Figure 21-S-B478 through 21-S-B480 - Particle Size Distribution Report
  Figure S-B478-B480 – USDA Soil Classification
Appendix C. Design Memorandum Limitations and Guidelines for Use

One copy submitted electronically



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI, USGS 24K Quadrangle Boston North, 1985.

Projection: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet

Site Locus Map

34 Dudley Street
Arlington, Massachusetts

GeoEngineers USA

Figure 1

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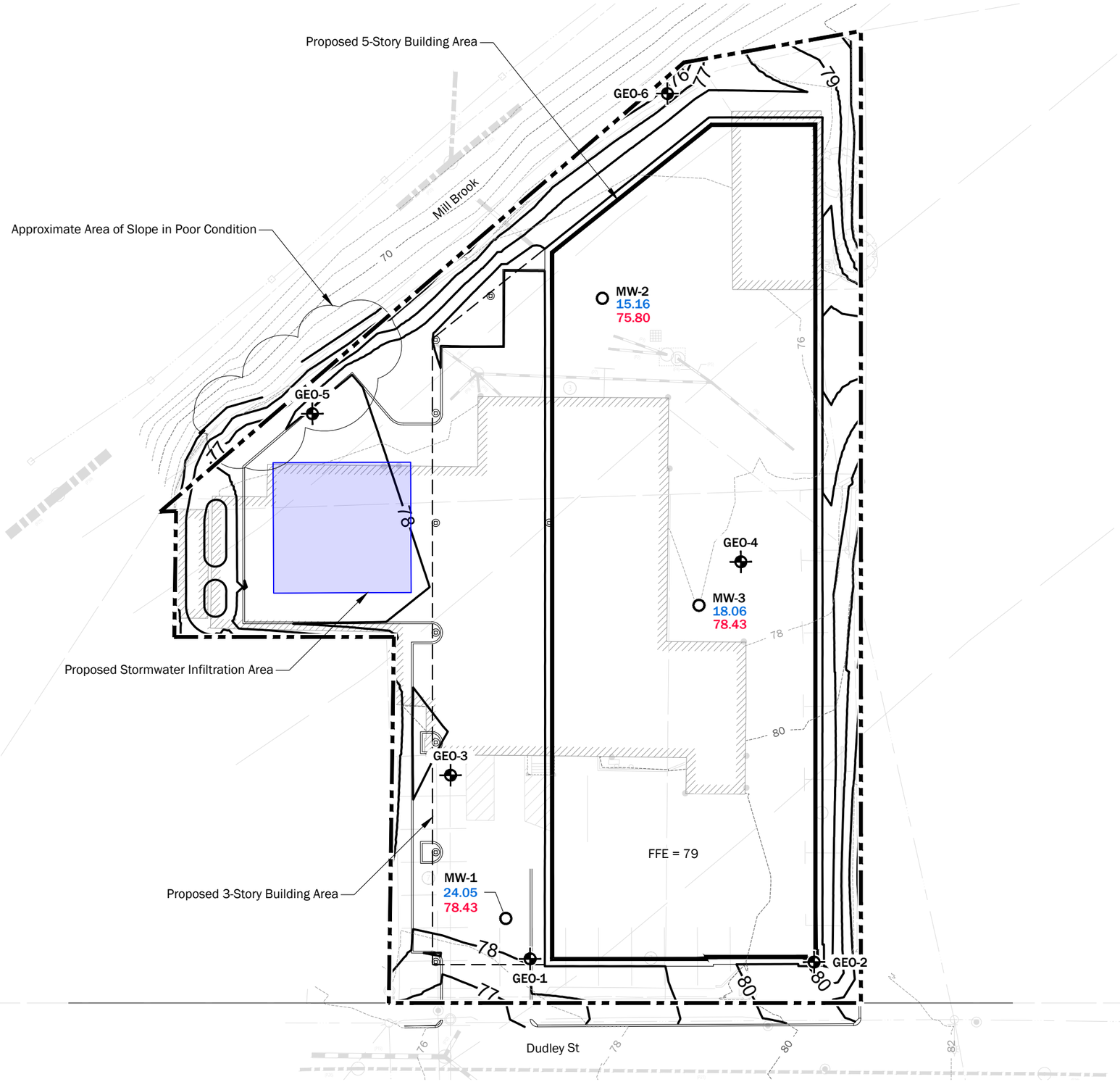

Legend

- Property Boundary
- Existing Building
- Proposed 5-Story Building Area
- Proposed 3-Story Building Area
- 80 — Proposed Grading
- Proposed Stormwater Infiltration Area
- GEO-1 — Boring by GeoEngineers, Inc., 2021 and 2022
- MW-1 — Monitoring Well by Others
  - 24.05 — Depth to Groundwater (Feet bgs) Based on Measurements Collected on December 18, 2021
  - 78.43 — Well Elevation (Feet)

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers USA, P.C. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers USA, P.C. and will serve as the official record of this communication.

Source(s): Background from VHB dated 10-28-2021.

Projection: MA State Plane, Mainland Zone, NAD83, US Foot

S W E N

30 0 30
Feet

Exploration Location Plan

34 Dudley St
Arlington, Massachusetts

GeoEngineers USA

Figure 2

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APPENDIX A
Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point lead test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
UU	Unconsolidated undrained triaxial compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

GeoEngineers USA

Figure A-1

Drilled Start 1/8/2022 End 1/8/2022	Total Depth (ft) 12	Logged By PS/MR Checked By	Driller G&M Subsurface	Drilling Method Direct Push	
Surface Elevation (ft) 78.5 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment GeoProbe 7822DT	
Easting (X) Northing (Y)		System Datum		Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
75	0	4	11		1		AC	Approximately 3 inches asphalt concrete pavement			
							SM	Dark brown-black fine to coarse sand, some gravel, little silt, very few ash particles (medium dense, moist) (fill)			
	5	6	19		2		SP	Brown-gray fine to coarse sand, some gravel, trace silt (medium dense, moist) (fill)			
70							SP	Brown-gray fine to coarse sand, some gravel, trace silt (very dense, moist)			Fill break determined by observations of direct push sleeve
	10	12	64		3						

Boring terminated at approximately 12 feet below ground surface due to direct push refusal

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on (undetermined). Vertical approximated based on Google Earth.

Log of Boring GEO-1

GeoEngineers USA

Project: 34 Dudley Street
Project Location: Arlington, Massachussetts
Project Number: 25754-001-00

Drilled	Start 12/18/2021	End 12/18/2021	Total Depth (ft)	12.75	Logged By / Checked By	SR/MR	Driller	Crawford Drilling Service	Drilling Method	Hollow-stem Auger
Surface Elevation (ft) / Vertical Datum	80.5 NAVD88		Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B52 Turck Rig				
Easting (X) / Northing (Y)			System Datum		Groundwater not observed at time of exploration					
Notes:										

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
80	0	10	36		1		AC	Approximately 3 inches asphalt concrete pavement			
							SM	Dark brown fine to coarse sand with some gravel, little silt (dense, moist) (fill)			
75	5	13	34		2		SP	Brown fine to coarse sand with some gravel, trace silt (dense, moist)			
70	10	11	72		3		SM	Brown fine to coarse sand with some gravel, little silt (very dense, moist)			
								Boring terminated at approximately 12.8 feet below ground surface due to auger refusal			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on (undetermined). Vertical approximated based on Google Earth.

Log of Boring GEO-2

GeoEngineers USA

Project: 34 Dudley Street
Project Location: Arlington, Massachussetts
Project Number: 25754-001-00

Drilled Start 12/9/2021 End 12/9/2021	Total Depth (ft) 25	Logged By VT Checked By	Driller G&M Subsurface	Drilling Method Direct Push	
Surface Elevation (ft) 79.5 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment GeoProbe 7822DT	
Easting (X) Northing (Y)		System Datum		Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
75	0		14	10		1		AC	Approximately 4 inches asphalt concrete pavement			
								SM	Brown fine to coarse sand and gravel with some silt, very few brick fragments and slag pieces (medium dense, moist) (fill)			
			50					SP	Light brown fine to coarse sand and gravel, with trace silt (dense, moist)			
70	5		52 15	36		2						
	10		36 16	71		3 4		SP	Light brown-tan fine to coarse sand and gravel, with trace silt (very dense, moist)			
65	15		42			5						
60	20					6						
55	25								Boring terminated at approximately 25 feet below ground surface due to direct-push refusal			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on (undetermined). Vertical approximated based on Google Earth.

Date:1/28/22 Path:P:\25\25754001\GINT\25754001100.GPJ DBLibrary/Library:GEOUSA_DF_STD_US.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

Log of Boring GEO-3

GeoEngineers USA

Project: 34 Dudley Street
Project Location: Arlington, Massachussetts
Project Number: 25754-001-00

Figure A-4
Sheet 1 of 1

Drilled Start 1/8/2022	End 1/8/2022	Total Depth (ft) 7	Logged By PS/MR Checked By	Driller G&M Subsurface	Drilling Method Direct Push
Surface Elevation (ft) 76 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment GeoProbe 7822DT	
Easting (X) Northing (Y)		System Datum		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
75	0	12	32		1		AC	Approximately 5 inches asphalt concrete pavement			Boring terminated at approximately 2.2 ft below ground surface due to direct push refusal; offset approximately 5 ft to the east and resumed advancing exploration
							SP	Brown-gray fine to coarse sand, some gravel, trace silt (dense, moist) (fill)			
70	5	15	80		2		SP	Brown-gray fine to coarse sand, some gravel, trace silt (very dense, moist)			
								Boring terminated at approximately 7 feet below ground surface due to direct push refusal			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on (undetermined). Vertical approximated based on Google Earth.

Date:1/28/22 Path:P:\25\25754001\GINT\25754001.GPJ DBLibrary/Library:GEOUSA_DF_STD_US.GLB/GEIB_GEOTECH_STANDARD_%F_NO_GW

Log of Boring GEO-4

GeoEngineers USA

Project: 34 Dudley Street
Project Location: Arlington, Massachussetts
Project Number: 25754-001-00

Figure A-5
Sheet 1 of 1

Drilled Start 12/18/2021 End 12/18/2021	Total Depth (ft) 16.25	Logged By SR/MR Checked By	Driller Crawford Drilling Service	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 75.5 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment B52 Turck Rig	
Easting (X) Northing (Y)		System Datum		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
75	0	12	12		1		AC	Approximately 3 inches asphalt concrete pavement			
							SM	Dark brown fine to coarse sand with some gravel, little silt, very few asphalt pieces, very few glass particles (medium dense, moist) (fill)			
70	5	6	9		2		SP	Brown fine to coarse sand with some gravel, trace silt, very few asphalt pieces (loose, moist) (fill)			
65	10	10	71		3		GP	Gray gravel with some sand, trace silt (very dense, moist)			
60	15	0	50/5"		4		NR	No recovery (very dense)			
		4	50/4"		5		SP	Gray fine to coarse sand and gravel, with trace silt (very dense, moist)			
								Boring terminated at approximately 16.3 feet below ground surface due to auger refusal			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on (undetermined). Vertical approximated based on Google Earth.

Log of Boring GEO-5

GeoEngineers USA

Project: 34 Dudley Street
Project Location: Arlington, Massachussetts
Project Number: 25754-001-00

Drilled Start 12/18/2021 End 12/18/2021	Total Depth (ft) 10.5	Logged By SR/MR Checked By	Driller Crawford Drilling Service	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 74.5 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment B52 Turck Rig	
Easting (X) Northing (Y)		System Datum		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0	8	36		1		AC	Approximately 3 inches asphalt concrete pavement			
							SM	Dark brown fine to coarse sand with some gravel, little silt, few wood pieces, very few brick particles (dense, moist) (fill)			
70	5	12	42		2		SM	Dark brown fine to coarse sand with little gravel and little silt (dense, moist) (fill)			Boring terminated at approximately 4 feet below ground surface due to auger refusal; offset approximately 10 feet northwest and continued advancing exploration
							SP	Brown fine to coarse sand with some gravel, trace silt (dense, moist)			
65	10	11	88/11"		3						

Boring terminated at approximately 10.5 feet below ground surface due to auger refusal

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on (undetermined). Vertical approximated based on Google Earth.

Log of Boring GEO-6

GeoEngineers USA

Project: 34 Dudley Street
Project Location: Arlington, Massachussetts
Project Number: 25754-001-00

Figure A-7
Sheet 1 of 1

APPENDIX B
Laboratory Testing Data Sheet

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GeoEngineers, Inc.
239 Causeway Street, Boston, MA 02114
PM: Mark Ruberti
Assigned By: Mark Ruberti
Collected By: Client

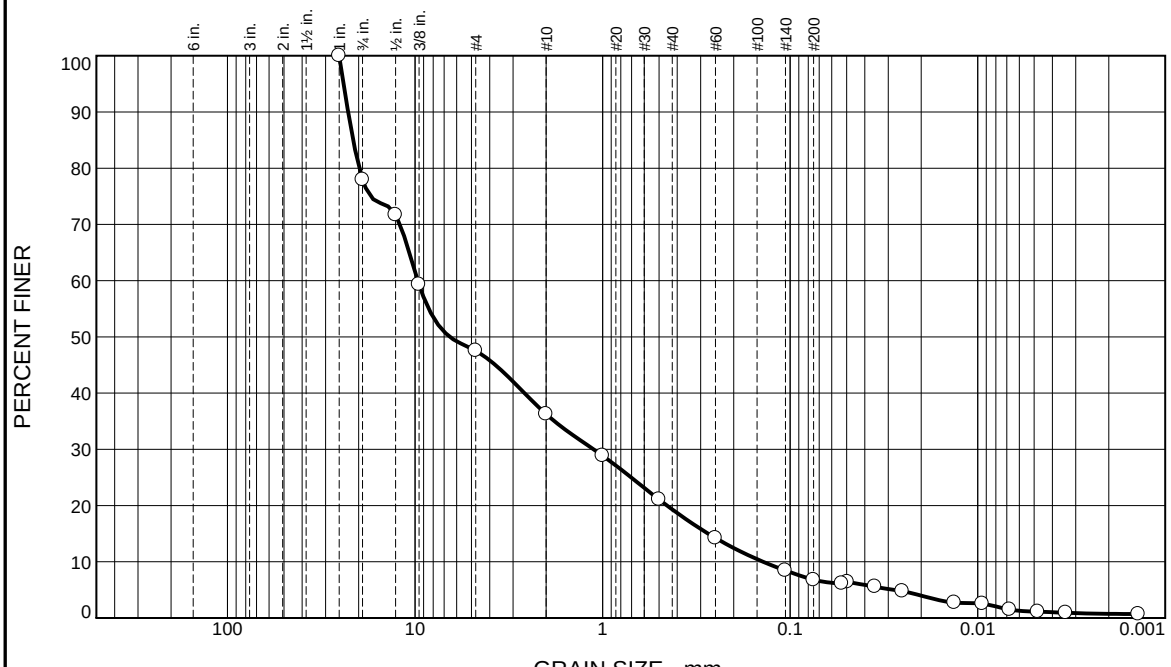
Project Information:
34 Dudley Street
Arlington, MA
GeoEngineers Project Number: 25754-001-00
Summary Page: 1 of 1
Report Date: 01.03.2022

LABORATORY TESTING DATA SHEET, Report No.: 7421-M-B010

Material Source	Sample No.	Depth (Ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	G_s	Dry unit wt. pcf	Test Water Content %	γ_d MAX (pcf) / W_{opt} (%)	γ_d MAX (pcf) / W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D854			D1557						
Boring	GEO-3 (S2 & S3)	5-12	21-S-B478				63.7	30.1	6.2											Light Brown loamy sand
Boring	GEO-5 (S1)	9-10.8	21-S-B479				68.3	23.9	7.8											Grey loamy sand
Boring	GEO-6 (S-1B)	5.3-6	21-S-B480				53.0	40.8	6.2											Light Brown sand

Date Received: ***12.21.21*** Reviewed By: Christine M Colburn Date Reviewed: ***01.03.22***

Particle Size Distribution Report



% Stones	% +3"	% Gravel			% Sand					% Silt		% Clay
		Coarse	Medium	Fine	V. Crs.	Crs.	Med.	Fine	V. Fine	Crs.	Fine	
0.0	0.0	22.1	30.4	11.2	7.4	7.8	6.9	6.1	1.9	2.2	3.3	0.7

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	77.9		
1/2"	71.7		
3/8"	59.3		
#4	47.5		
#10	36.3		
#18	28.9		
#35	21.1		
#60	14.2		
#140	8.4		
#200	6.8		
#270	6.2		
0.0494 mm.	6.4		
0.0353 mm.	5.6		
0.0252 mm.	4.8		
0.0133 mm.	2.7		
0.0094 mm.	2.5		
0.0068 mm.	1.5		
0.0048 mm.	1.1		
0.0034 mm.	0.9		
0.0014 mm.	0.7		

* (no specification provided)

Material Description

Light Brown loamy sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 22.7414 D_{85}= 21.3790 D_{60}= 9.6783
D_{50}= 6.5171 D_{30}= 1.1164 D_{15}= 0.2733
D_{10}= 0.1393 C_u= 69.50 C_c= 0.92

Remarks

Date Received: 12/21/21 **Date Tested:** 12/28/21

Tested By: DN / CC

Checked By: Christina Colman

Title: Laboratory Supervisor

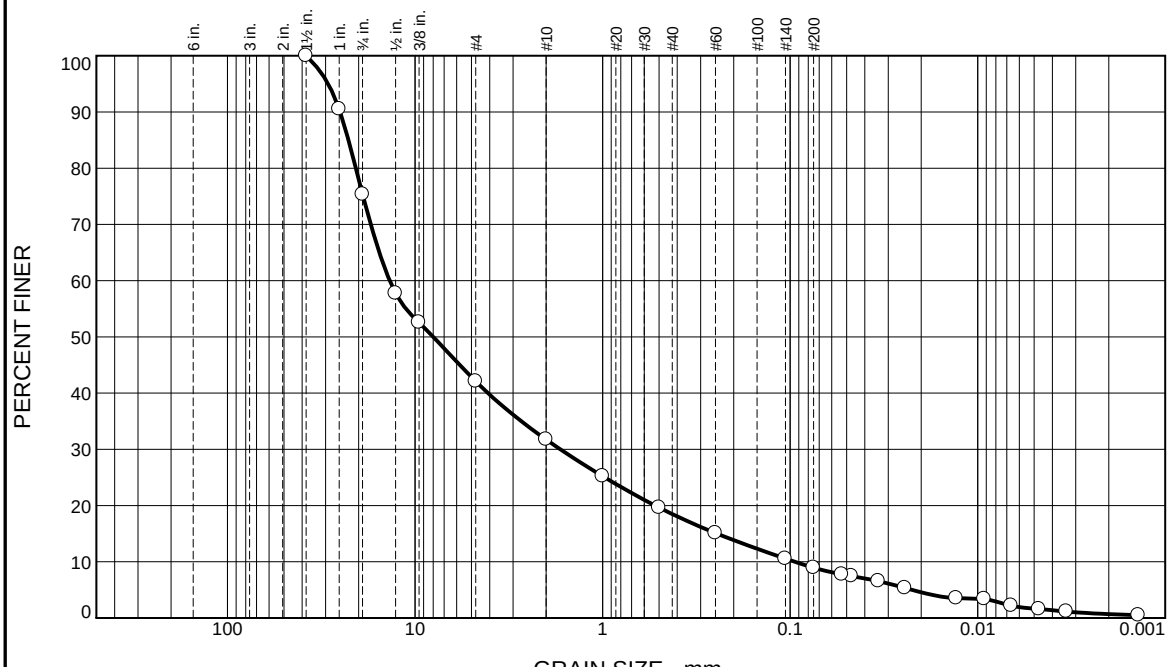
Source of Sample: Boring **Depth:** 5-12' **Date Sampled:**
Sample Number: GEO-3 (S2 & S3)

Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
Project: 34 Dudley Street
Arlington, MA
Project No: 25754-001-00 **Figure** 21-S-B478

Particle Size Distribution Report



% Stones	% +3"	% Gravel			% Sand					% Silt		% Clay
		Coarse	Medium	Fine	V. Crs.	Crs.	Med.	Fine	V. Fine	Crs.	Fine	
0.0	0.0	24.6	33.3	10.4	6.5	5.6	4.5	4.8	2.5	3.2	3.9	0.7

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1 1/2"	100.0		
1"	90.5		
3/4"	75.4		
1/2"	57.8		
3/8"	52.6		
#4	42.1		
#10	31.7		
#18	25.2		
#35	19.6		
#60	15.1		
#140	10.6		
#200	8.9		
#270	7.8		
0.0471 mm.	7.5		
0.0338 mm.	6.6		
0.0244 mm.	5.3		
0.0130 mm.	3.5		
0.0092 mm.	3.4		
0.0066 mm.	2.2		
0.0047 mm.	1.6		
0.0034 mm.	1.1		
0.0014 mm.	0.5		

* (no specification provided)

Material Description

Grey loamy sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 25.0933 D_{85}= 22.6442 D_{60}= 13.6565
D_{50}= 7.9942 D_{30}= 1.6791 D_{15}= 0.2453
D_{10}= 0.0945 C_u= 144.54 C_c= 2.18

Remarks

Date Received: 12/21/21 **Date Tested:** 12/28/21

Tested By: DN / CC

Checked By: Christina Colman

Title: Laboratory Supervisor

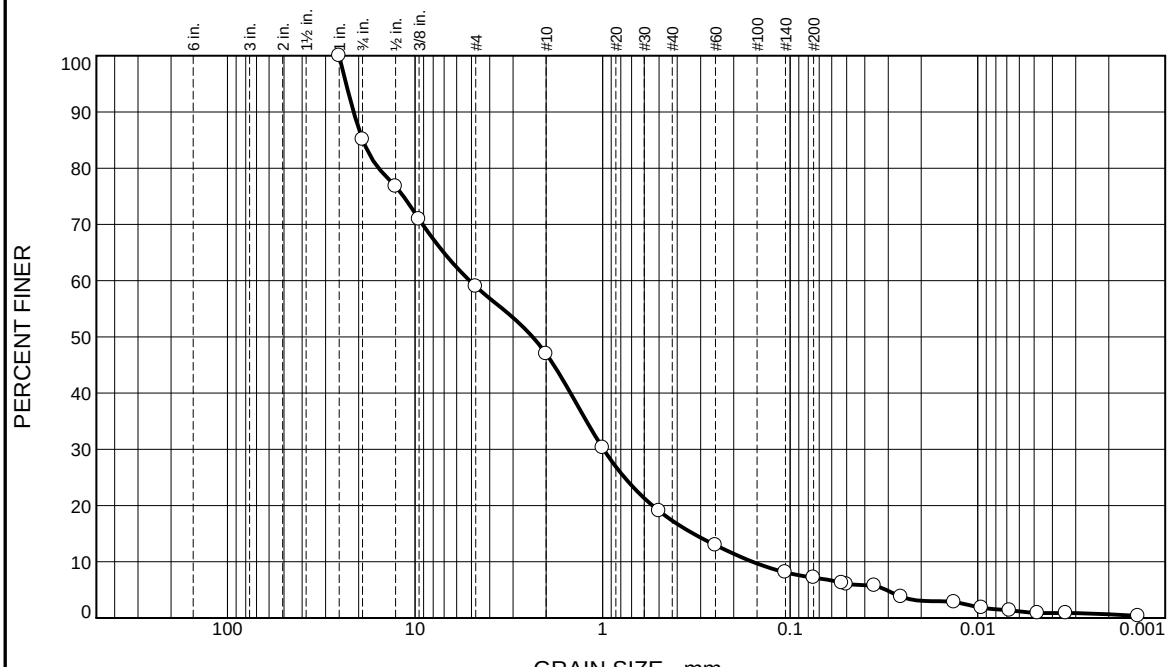
Source of Sample: Boring **Depth:** 9-10.8' **Date Sampled:**
Sample Number: GEO-5 (S1)

Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
Project: 34 Dudley Street
Arlington, MA
Project No: 25754-001-00 **Figure** 21-S-B479

Particle Size Distribution Report



% Stones	% +3"	% Gravel			% Sand					% Silt		% Clay
		Coarse	Medium	Fine	V. Crs.	Crs.	Med.	Fine	V. Fine	Crs.	Fine	
0.0	0.0	14.9	26.1	12.0	16.7	11.3	6.0	5.1	1.7	3.1	2.4	0.7

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	85.1		
1/2"	76.8		
3/8"	70.9		
#4	59.0		
#10	47.0		
#18	30.3		
#35	19.0		
#60	13.0		
#140	8.1		
#200	7.2		
#270	6.2		
0.0502 mm.	6.0		
0.0356 mm.	5.8		
0.0256 mm.	3.8		
0.0134 mm.	2.8		
0.0095 mm.	1.8		
0.0068 mm.	1.4		
0.0048 mm.	0.9		
0.0034 mm.	0.9		
0.0014 mm.	0.4		

* (no specification provided)

Material Description

Light Brown sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SW-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 21.2538 D_{85}= 18.9911 D_{60}= 5.1201
D_{50}= 2.3620 D_{30}= 0.9875 D_{15}= 0.3280
D_{10}= 0.1585 C_u= 32.31 C_c= 1.20

Remarks

Date Received: 12/21/21 **Date Tested:** 12/28/21

Tested By: DN / CC

Checked By: Christina Colman

Title: Laboratory Supervisor

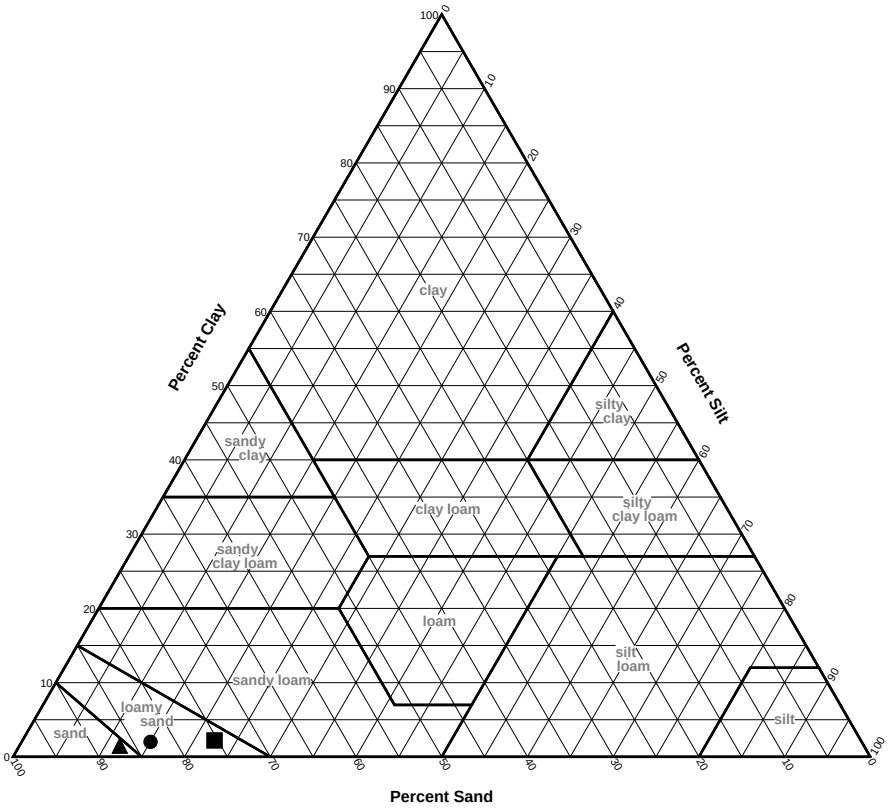
Source of Sample: Boring **Depth:** 5.3-6' **Date Sampled:**
Sample Number: GEO-6 (S-1B)

Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
Project: 34 Dudley Street
Arlington, MA
Project No: 25754-001-00 **Figure** 21-S-B480

USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Boring	GEO-3 (S2 & S3)	5-12'	82.9	15.2	1.9	Loamy sand
■	Boring	GEO-5 (S1)	9-10.8'	75.4	22.4	2.2	Loamy sand
▲	Boring	GEO-6 (S-1B)	5.3-6'	86.8	11.7	1.5	Sand

Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.

Project: 34 Dudley Street
Arlington, MA

Project No.: 25754-001-00

Figure S-B478-B480

APPENDIX C
Design Memorandum Limitations and Guidelines for Use

APPENDIX C
DESIGN MEMORANDUM LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this memorandum.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its memorandums. Please confer with GeoEngineers if you need to know more how these "Stormwater Evaluation Memorandum Limitations and Guidelines for Use" apply to your project or site.

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This memorandum has been prepared for PSI Atlantic Arlington MA, LLC and for the Project(s) specifically identified in the memorandum. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this memorandum is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our Agreement with PSI Atlantic Arlington MA, LLC dated December 29, 2021 and generally accepted geotechnical practices in this area at the time this memorandum was prepared. We do not authorize, and will not be responsible for, the use of this memorandum for any purposes or projects other than those identified in the memorandum.

A Geotechnical and Stormwater Evaluation Memorandum is based on a Unique Set of Project-Specific Factors

This memorandum has been prepared for schematic design for the proposed development concept located at 34 Dudley Street in Arlington, Massachusetts. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and memorandum. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this memorandum if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

For example, changes that can affect the applicability of this memorandum include those that affect:

- The function of the proposed structure;
- Elevation, configuration, location, orientation or weight of the proposed structure;

[1] Developed based on material provided by GBA, GeoProfessional Business Association; www.geoprofessional.org.

- Composition of the design team; or
- Project ownership.

If changes occur after the date of this memorandum, GeoEngineers cannot be responsible for any consequences of such changes in relation to this memorandum unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This stormwater evaluation memorandum is based on conditions that existed at the time the study was performed. The findings and conclusions of this memorandum may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the memorandum date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our memorandum or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this memorandum for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical and Geologic Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this memorandum. Our memorandum, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Stormwater Evaluation Memorandum Recommendations are Not Final

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this memorandum are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this memorandum if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A Stormwater Evaluation Memorandum Could Be Subject to Misinterpretation

Misinterpretation of this memorandum by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the memorandum, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering memorandum should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the memorandum can create a risk of misinterpretation.

Give Contractors a Complete Memorandum and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering memorandum, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the memorandum was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Geotechnical, Geologic and Environmental Memoranda Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic memorandum does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental memoranda are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this memorandum does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

Information Provided by Others

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.

Map Scale: 1:2,570 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 13, 2020—Sep 15, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	3.9	28.6%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	3.5	26.1%
655	Udorthents, wet substratum	6.1	45.3%
Totals for Area of Interest		**13.6**	**100.0%**

Required and Provided Recharge Volumes

Recharge Calculations

Project	Arlington Self Storage	**Project #**	52816.00
Calculated by	MEA	**Date**	4/21/2022
Checked by	EKG	**Date**	4/21/2022

REQUIRED RECHARGE VOLUME

Hydrologic Soil Group (HSG)	Area (ft^2)	Inches of Runoff (in)	Volume (ft^3)
A	24,852	0.60	1,243
B	0	0.35	0
C	0	0.25	0
D	0	0.10	0
TOTAL			**1,243**

CAPTURE AREA ADJUSTMENT

Required Recharge Volume (ft^3)	1,243
Total Site Net Impervious Area (ft^2)	24,852
Total Site Impervious Area Draining to Recharge Facilities (ft^2)	24,150
Capture Area Adjustment Factor	1.03
Adjusted Required Recharge Volume (ft^3)	**1,279**

PROVIDED RECHARGE VOLUME

SUBSURFACE INFILTRATION SYSTEM #1:

MC-4500

Volumes provided below the lowest outlet at elevation: 71.7

Provided Volume:	Bottom Area (ft^2)	Volume (ft^3)
	1,112	**1,954**

Drawdown: $(V_{Infiltration}/A_{Bottom})$/Rawl's Rate

Rawls Recharge Rate:	2.4	(in/hr)
Drawdown Time:	8.75	(hours)

RECHARGE VOLUME SUMMARY

Required Recharge Volume:	**1,243**	(ft^3)
Total Recharge Volume Provided:	**1,954**	(ft^3)

Appendix D: Standard 4 Computations and Supporting Information

- Operation and Maintenance Plan
- Water Quality Volume Calculations
- TSS Removal Worksheets

Operations and Maintenance Plan

Proposed Self-Storage Facility

34 Dudley Street
Arlington, Massachusetts

PREPARED FOR

PSI Atlantic Arlington MA, LLC
530 Oak Court Drive, Suite 155
Memphis, TN 38117

PREPARED BY

2 Bedford Farms Drive
Suite 200
Bedford, NH 03110
603.391.3900

February 2022
Revised April 21, 2022

Table of Contents

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Project Informtion

Site

Proposed Self-Storage Facility
34 Dudley Street
Arlington, Massachusetts, 02476

Developer

PSI Atlantic Arlington MA, LLC.
530 Oak Court Drive, Suite 155
Memphis, TN 38117
Phone Number: _____

Site Supervisor

Site Manager Name_____
Site Manager Address_____
Site Manager City, State Zip_____
Site Manager Phone Number_____

Site Contact

Name: _____

Telephone: _____

Cell phone: _____

Email: _____

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Section A: Source Control

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A Source Control

A comprehensive source control program will be implemented at the Proposed Self-Storage Facility, which includes the following components:

- Regular pavement sweeping on the asphalt surfaces
- Catch basin cleaning
- Clearing litter from the parking area, islands, and perimeter landscape areas
- Enclosure and regular maintenance of all dumpsters
- Spill Prevention training

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Section B: Spill Prevention

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B Spill Prevention

Spill prevention equipment and training will be provided by the Owner or property management company.

B.1 Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

Facility Manager (name): _____

Facility Manager (phone): _____

Construction Manager (name) : _____

Construction Manager (phone): _____

The supervisor will first contact the Fire Department and then notify the Police Department, the Public Health Commission and the Conservation Commission. The Fire Department is ultimately responsible for matters of public health and safety and should be notified immediately.

B.2 Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachussets Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees. A hazardous waste spill report shall be completed as necessary using the attached form.

Emergency Notification Phone Numbers

1. FACILITY MANAGER

Name: _____ Phone: _____

Beeper/Cell: _____

Home Phone: _____

Alternate Contact: _____ Phone: _____

Beeper/Cell: _____

Home Phone: _____

2. FIRE & POLICE DEPARTMENT Emergency: 911

3. CLEANUP CONTRACTOR

Address: _____ Phone: _____

4. STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) Emergency: 978-694-3200

5. NATIONAL RESPONSE CENTER Phone: (800) 424-8802

Alternate: U.S. Environmental Protection Agency Emergency: _____

Business: _____

6. MUNICIPAL HEALTH DEPARTMENT Phone: (781) 316-3170

Municipal Conservation Commission: Phone: (781) 316-3090

Hazardous Waste & Oil Spill Report

Date: _____ **Time:** _____ **AM / PM**

Exact location (Transformer #): _____

Type of equipment: _____ **Make:** _____ **Size:** _____

S / N: _____ **Weather Conditions:** _____

On or near water? ☐ Yes ☐ No **If yes, name of body of water:** _____

Type of chemical / oil spilled: _____

Amount of chemical / oil spilled: _____

Cause of spill: _____

Measures taken to contain or clean up spill: _____

Amount of chemical / oil recovered: _____ **Method:** _____

Material collected as a result of cleanup:

_____ drums containing _____

_____ drums containing _____

_____ drums containing _____

Location and method of debris disposal: _____

Name and address of any person, firm, or corporation suffering charges: _____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring: _____

Spill reported by General Office by: _____ **Time:** _____ **AM / PM**

Spill reported to DEP / National Response Center by: _____

DEP Date: _____ **Time:** _____ **AM / PM** **Inspector:** _____

NRC Date: _____ **Time:** _____ **AM / PM** **Inspector:** _____

Additional comments: _____

B.3 Assessment – Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. A list of recommended spill equipment to be kept on site is included on the following page.

Fire / Police Department: 911

Municipality Health Department (781) 316-3170

Municipality Conservation Commission: (781) 316-3090

Emergency Response Equipment

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

Supplies	Quantity	Recommended Suppliers
› Sorbent Pillows/"Pigs"	2	http://www.newpig.com Item # KIT276 — mobile container with two pigs
› Sorbent Boom/Sock	25 feet	http://www.forestry-suppliers.com
› Sorbent Pads	50	
› Lite-Dri® Absorbent	5 pounds	
› Shovel	1	Item # 33934 — Shovel (or equivalent)
› Pry Bar	1	Item # 43210 — Manhole cover pick (or equivalent)
› Goggles	1 pair	Item # 23334 — Goggles (or equivalent)
› Gloves – Heavy	1 pair	Item # 90926 — Gloves (or equivalent)

Section C: Snow Management

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C Snow Management

Snow storage areas are shown on the attached Map.

- Snow storage areas will be managed to prevent blockage of storm drain catch basins and stormwater drainage swales. Snow combined with sand and debris may block a storm drainage system, diminishing the infiltration capacity of the system and causing localized flooding.
- Sand and debris deposited on vegetated or paved areas shall be cleared from the site and properly disposed of at the end of the snow season, no later than May 15.
- Snow shall not be dumped into any waterbody, pond, or wetland resource area.

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Section D: Maintenance of Stormwater Management Systems

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D Maintenance of Stormwater Management Systems

D.1 Pavement Systems

D.1.1 Standard Asphalt Pavement

- Sweep or vacuum standard asphalt pavement areas at least four times per year with a rotary brush sweeper or vacuum sweeper and properly dispose of removed material.
- Recommended sweeping schedule:
- Oct/Nov
- Feb/Mar
- Apr/May
- Aug/Sep
- More frequent sweeping of paved surfaces will result in less accumulation in catch basins, less cleaning of subsurface structures, and less disposal costs.
- Check loading docks and dumpster areas frequently for spillage and/or pavement staining and clean as necessary.

D.2 Structural Stormwater Management Devices

D.2.1 Catch Basins and Area Drains

The proper removal of sediments and associated pollutants and trash occurs only when catch basin inlets and sumps are cleaned out regularly. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future deposition and enhances the overall performance. As noted in the pavement Operation and Maintenance (O&M) section, more frequent sweeping of paved surfaces will result in less accumulation in catch basins, less cleaning of subsurface structures, and less disposal costs.

There is one (1) catch basin and two (2) area drains at the Self-Storage Facility. These catch basins are constructed with sumps (minimum 4 feet) and hooded outlets to trap debris,

sediments, and floating contaminants. Disposal of all sediments must be in accordance with applicable local, state, and federal guidelines. A map of the catch basin locations is included in Section E.5 Maintenance Checklists and Device Location Maps.

Inspections and Cleaning

- All catch basins shall be inspected at least four times per year and cleaned a minimum of at least once per year.
- Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
- During colder periods, the catch basin grates must be kept free of snow and ice.
- During warmer periods, the catch basin grates must be kept free of leaves, litter, sand, and debris.

D.2.2 Subsurface Infiltration Basins

The subsurface infiltration/detention basins are used to detain and infiltrate roadway and rooftop runoff. There is one (1) subsurface infiltration basin at the Self-Storage Facility. Each of these basins has a water quality pre-treatment device in the form of a subsurface sediment removal row to protect the infiltration bed from clogging. The sediment removal row is an integral part of the underground infiltration system and is comprised of a perforated pipe, wrapped in a filter fabric and surrounded with gravel. To maintain pre-treatment functionality, this sediment removal row requires regular inspection and cleaning. A map of the infiltration basin locations is included in Section E.5 Maintenance Checklists and Device Location Maps.

Inspections and Cleaning

- The subsurface infiltration systems will be inspected at least once each year by removing the manhole/access port covers and determining the thickness of sediment that has accumulated in the sediment removal row.
- If sediment is more than six inches deep, it must be suspended via flushing with clean water and removed using a vactor truck.
- Manufacturer's specifications and instructions for cleaning the sediment removal row are provided as an attachment to this section.
- Emergency overflow pipes will be examined at least once each year and verified that no blockage has occurred.
- System will be observed after rainfalls to see if it is properly draining.

D.2.3 Stormwater Outfalls

The stormwater drainage system at the Self-Storage Facility has one (1) outfall location where treated stormwater is discharged towards Mill Brook. A map of this location is included in Section E.5 Maintenance Checklists and Device Location Maps.

- Inspect outfall locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect outfalls annually after initial three month period.
- Annual inspections should be supplemented after large storms, when washouts may occur.
- Maintain vegetation around outfalls to prevent blockages at the outfall.
- Maintain rip rap pad below each outfall and replace any washouts.
- Remove and dispose of any trash or debris at the outfall.

D.2.4 Roof Drain Leader

Roof runoff from buildings and parking areas at the Self-Storage Facility are directed to the bioretention basin and to the subsurface infiltration units.

- Perform routine roof inspections quarterly.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets twice per year or as necessary.

D.3 Vegetated Stormwater Management Devices

D.3.1 Rain Gardens / Bioretention Basins

The rain gardens at the Self-Storage Facility are excavated shallow surface depressions planted with specially-selected native vegetation to treat and capture runoff. The rain garden also has an overflow structure leading to the subsurface infiltration system to handle larger storm volumes. A location map for the rain garden can be found in Section E.5 Maintenance Checklists and Device Location Maps.

The vegetation in the rain gardens serves to filter runoff — improving water quality and reducing runoff quantity — and the root systems can enhance infiltration. The soil medium filters out pollutants and allows storage and infiltration of stormwater runoff; and the infiltration bed provides additional volume control. Properly designed rain gardens may mimic natural forest ecosystems through species diversity, density and distribution of vegetation, and the use of native species, resulting in a system that is resistant to insects, disease, pollution, and climatic stresses.

Rain gardens require routine maintenance (similar to conventional landscaping maintenance) to ensure that the system both functions well as a stormwater management practice while also maintaining an aesthetic quality compatible with the surrounding land uses.

Replacement of mulch is an important part of rain garden maintenance. Mulch keeps the soil moist, allowing for easy infiltration of rain water. Un-mulched surfaces may develop into a hardpan, a condition in which the soil surface becomes cemented together, forming a hard, impervious layer. Mulching also protects plants and reduces weed growth.

Initial Post-Construction Inspection

- During the initial period of vegetation establishment pruning and weeding are required twice in first year by contractor.
- Any dead vegetation found after the first year must be replaced.
- Proper mulching is mandatory and regular watering may be required initially to ensure proper establishment of new vegetation.

Long-Term Maintenance

- Weeds and invasive plant species shall be removed by hand.
- Leaf litter and other detritus shall be removed twice per year.
- If needed to maintain aesthetic appearance, perennial plantings may be trimmed at the end of the growing season.
- Trees and shrubs should be inspected twice per year to evaluate health and attended to as necessary.
- Re-mulch rain gardens with well aged hardwood mulch to a depth of 3 inches each spring or whenever erosion is evident. The entire area may require mulch replacement once every two to three years. Mulch depth shall not exceed 3 inches and the depth of the depression shall not be compromised by the accumulation of vegetation or old mulch.
- Seeded ground cover or grass areas shall not receive mulching.
- Fertilizers should not be used in the rain garden as excessive nutrients in the rain garden may migrate to the underdrain and be discharged to adjacent surface waters.
- Test pH of the soils in the planting bed annually. If the pH is below 5.2, limestone should be applied to increase it. If the pH is above 8.0, iron sulfate plus sulfur should be added to reduce it.
- Rain gardens may require watering during periods of extended drought.

Inspections and Cleaning

- Rain gardens shall be inspected twice during for the first year and annually thereafter for sediment buildup, erosion, vegetative conditions, etc. If sediment build-up is found, sediment removal and core aeration or cultivating of un-vegetated areas may be required to ensure adequate filtration.

- The inflow location should be inspected annually for clogging. Sediment build up is a common problem where runoff leaves an impervious surface and enters a vegetative or earthen surface. Any built-up sediment should be removed to prevent runoff from bypassing the facility. Sources of sediment should be prevented.
- The overflow structure and underdrain standpipes should be inspected annually to ensure that they are functioning.
- Inspect rain gardens after a large storm event to ensure that proper drainage is occurring. Water that remains ponded on the surface of the rain garden after 48 hours of dry weather could indicate a problem with the subsurface drainage system or clogging of the underdrain. While the plants selected for the rain garden are tolerant of wet soils, they are not wetland species that can survive long periods of inundation. Immediate attention is required to prevent the loss of plant materials.

D.3.2 Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of the stormwater management system. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings and proper aeration of soils.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.
- Annual application of compost amendments and aeration are recommended.

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Section E: Operations and Maintenance Plan Summary

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E Operations and Maintenance Plan Summary

This Operation and Maintenance Plan has been prepared in accordance with the Stormwater Management Policy developed by the DEP and CZM and local regulations as applicable. It specifies operational practices and drainage system maintenance requirements for the the Self-Storage Facility redevelopment. Requirements should be adjusted by the site manager as necessary to ensure successful functioning of system components.

E.1 Routine Maintenance Checklists

Routine required maintenance is described in Sections A – D. The following checklists are to be used by the property manager to implement and document the required maintenance and inspection tasks.

E.2 Reporting and Documentation

The site supervisor shall be responsible for ensuring that the scheduled tasks as described in this plan are appropriately completed and recorded in the Maintenance Log. Accurate records of all inspections, routine maintenance and repairs shall be documented and these records shall be available for inspection by members of the Town of Arlington Conservation Commission or other designated body, or their designated agent, upon request.

The Maintenance Log shall:

- Document the completion of required maintenance tasks.
- Identify the person responsible for the completion of tasks.
- Identify any outstanding problems, malfunctions or inconsistencies identified during the course of routine maintenance.
- Document specific repairs or replacements.

E.3 Construction Practices Maintenance/ Evaluation Checklist

Self-Storage Facility – Arlington, Massachusetts

Best Management Practice	Inspection Frequency	Date Inspected	Inspector Initials	Minimum Maintenance and Key Items to Check	Cleaning or Repair Needed ☐Yes/No (List Items)	Date of Cleaning or Repair	Performed by:
Compost Filter Tube/Hay Bales/ Silt Fencing	Weekly and after any rainfall			Sediment build up, broken or damaged tubes, bales or stakes			
Gravel Construction Entrance	Weekly and after any rainfall			Filled voids, runoff/sediments into street			
Catch Basin Protection	Weekly and after any rainfall			Clogged or sediment build-up at surface or in basin			
Containment Berm	Weekly and after any rainfall			Maintained, moved as necessary to correct locations, Check for erosion or breakout			
Diversion Channels	Weekly and after any rainfall			Maintained, moved as necessary to correct locations, Check for erosion or breakout			
Temporary Sedimentation Basins	Weekly and after any rainfall			Cracking, erosion, breakout, sediment buildup, contaminants			

Stormwater Control Manager: _____

E.4 Long-term Maintenance/Evaluation Checklist

Self-Storage Facility – Arlington, Massachusetts

Best Management Practice	Minimum Maintenance and Key Items to Check	Inspection Frequency	Date Inspected	Inspector Initials	Cleaning Frequency	Cleaning or Repair Needed ☐Yes/No	Date of Cleaning or Repair	Performed by:
Street Sweeping	Vacuum sweeper	4X per year			4X per year* minimum			
Outfall Structures	Remove debris and excess vegetation, replace any dislodged riprap	1X per year			1X per year			
Deep Sump and Hooded Catch basins	Remove sediment 1X per year or if >6 inches	4X per year			1X per year or as necessary			
Subsurface Infiltration Basins	Remove sediment 1X per year or if >6 inches	1X per year			1X per year			
Rain Gardens/ Bioretention Basins	Inspect inlets, vegetation, overflow discharge pipes, drain time less than 4 days	2X per year first year, annually thereafter			2X per year first year, annually thereafter			
Roof Drains	Remove debris, clean inlets draining to subsurface bed	4x per year roof inspection			2x per year inlet cleaning, roof debris as necessary			

* Recommend sweeping Oct/Nov, Feb/Mar, Apr/May Jul/Aug with late winter most important

Stormwater Control Manager: _____

E.5 Maintenance Checklists and Device Location Maps

These checklists are provided for the maintenance crew to photocopy and use when conducting inspections and cleaning activities to the stormwater management systems.

Maintenance Checklists

Catchbasins – Inspect 4 times per year, clean when sediment depth >6 inches or at least once per year.

Catch Basin / Area Drains	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
CB 1				/ /	
AD 1				/ /	
AD-2				/ /	

Outfalls – Inspect 4 times per year, replace any dislodged rip-rap, remove excess vegetation, remove any debris.

Outfall	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
OF 1				/ /	

Infiltration Basins – Inspect once per year, remove sediment if more than 6 inches has accumulated in isolator row and as per manufacturers recomendations.

Basin	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
IB 1				/ /	

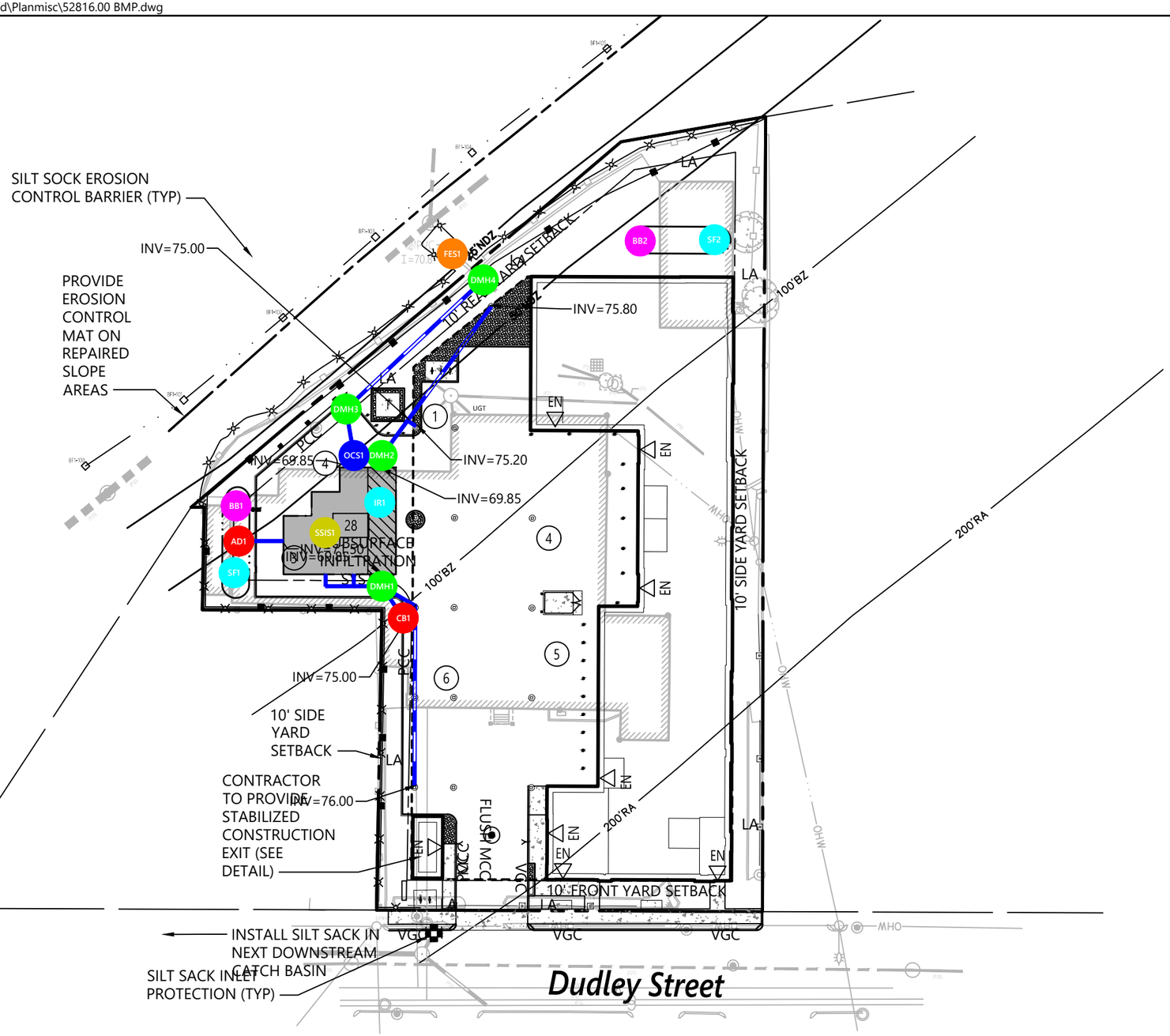
Rain Gardens/Bioretention Basins – Inspect twice during first year and annually thereafter for sediment buildup, erosion, vegetative conditions, etc. If sediment build-up is found, core aeration or cultivating of unvegetatd areas may be required to ensure adequate filtration. The overflow should be inspected annually to ensure that it is functioning.

Bioretention Basin	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
BB 1				/ /	
BB 2				/ /	

Roof Runoff Downspouts – Inspect roof drains monthly, clean inlets draining to the subsurface bed twice per year.

Bldg #	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
Bldg 1				/ /	

Device Location Map



Legend

- CB = CATCH BASIN
  AD = AREA DRAIN
- OCS — OUTLET CONTROL STRUCTURE
- SSIS — SUBSURFACE INFILTRATION SYSTEM
- DMH — DRAINAGE MANHOLES
- FES — FLARED END SECTION / OUTFALL
- BB — BIORETENTION BASIN
- IR = ISOLATOR ROW
  SF = SEDIMENT FOREBAY
- DRAINAGE PIPES

0 50 100 Feet

vhb

Proposed Self Storage Facility
34 Dudley Street
Arlington, MA
Project #: 52816.00

Figure 1

02/09/2022
REV 04/21/2022

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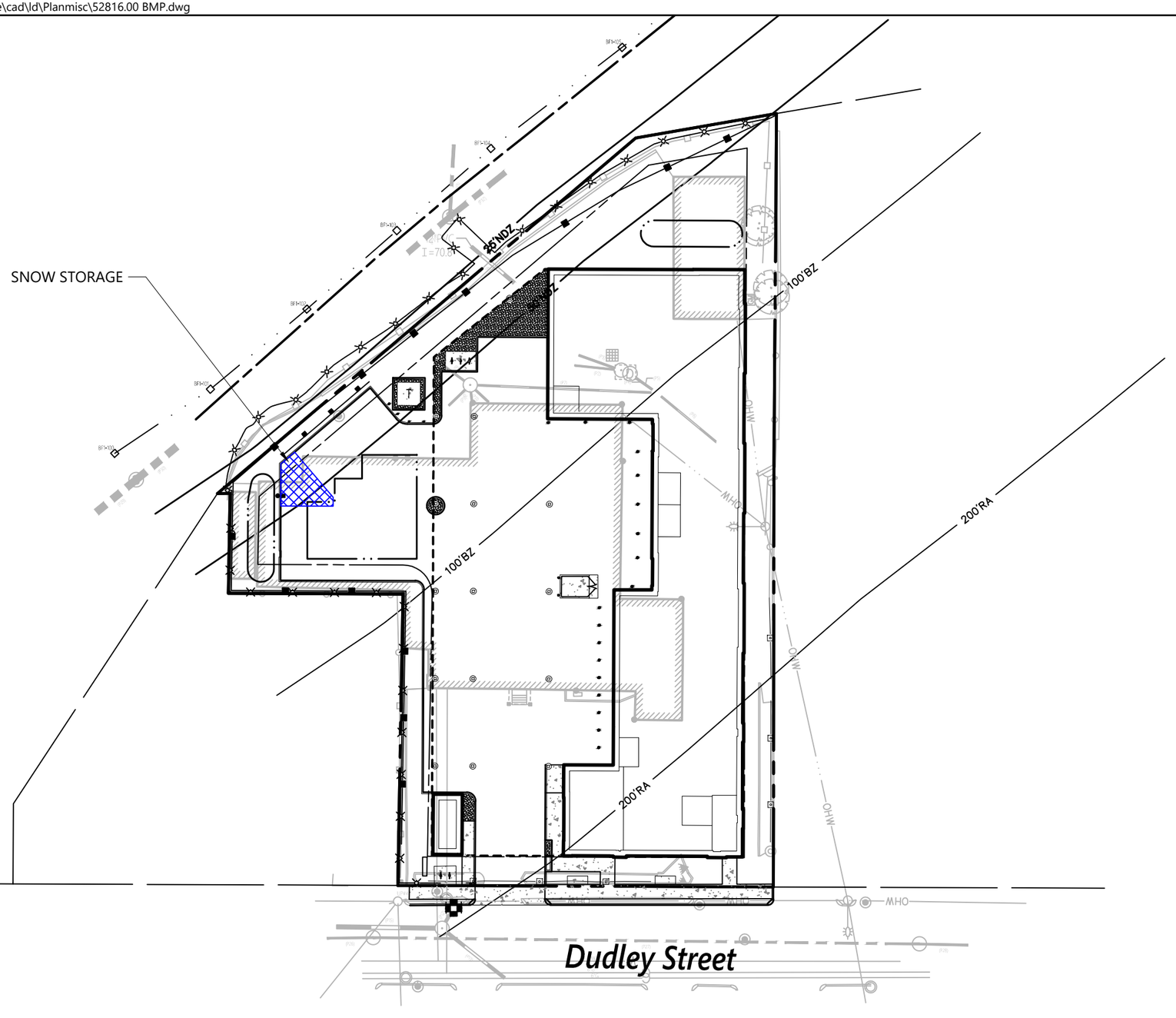
Snow Storage Areas Map



Legend

SNOW STORAGE AREA

0 50 100 Feet

Proposed Self Storage Facility
34 Dudley Street
Arlington, MA
Project #: 52816.00

Figure 2

02/09/2022
REV 04/21/2022

Section F: Product Literature

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F Product Literature

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StormTech MC-4500 Chamber

MC-4500 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for commercial and municipal applications.

StormTech MC-4500 Chamber (not to scale)

Nominal Chamber Specifications

Size (L x W x H)	52" (1321 mm) x 100" (2540 mm) x 60" (1524 mm)
Chamber Storage	106.5 ft³ (3.01 m³)
Min. Installed Storage*	192.0 ft³ (4.60 m³)
Weight	120 lbs (54.4 kg)

*This assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 9" (230 mm) between chambers/end caps and 40% stone porosity.

StormTech MC-4500 End Cap (not to scale)

Nominal Chamber Specifications

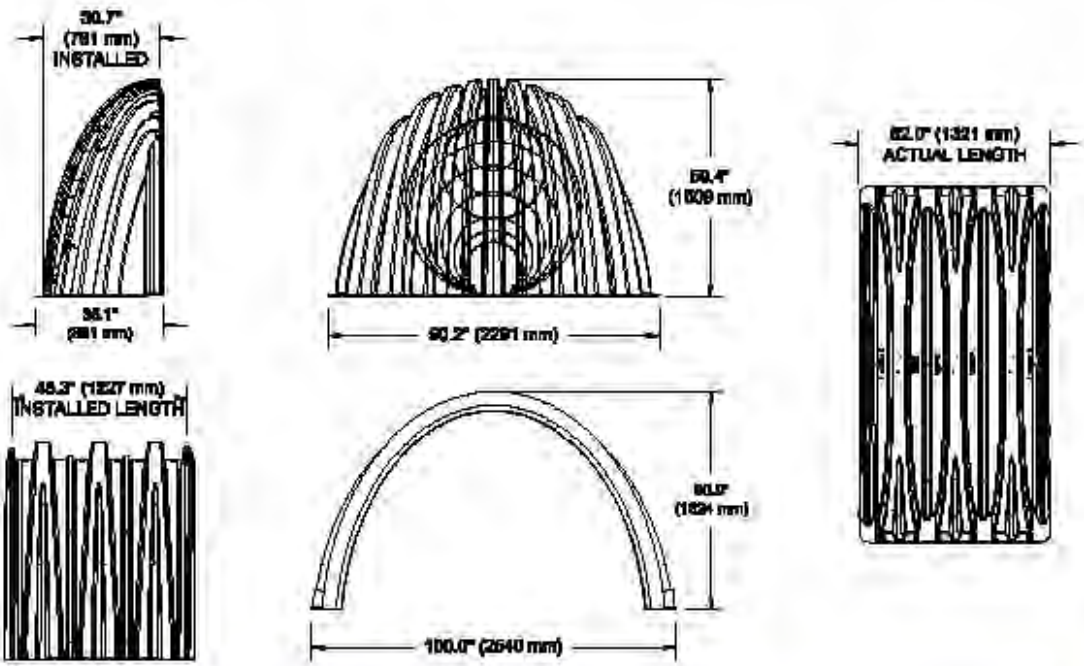
Size (L x W x H)	35.1" (891 mm) x 90.2" (2291 mm) x 59.4" (1509 mm)
Chamber Storage	35.7 ft³ (1.01 m³)
Min. Installed Storage*	106.7 ft³ (3.08 m³)
Weight	129 lbs (58.4 kg)

*This assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 6" (150 mm) of stone perimeter, 9" (230 mm) between chambers/end caps and 40% stone porosity.

Shipping

7 chambers/pallet

11 pallets/truck



StormTech MC-4500 Chamber

Storage Volume Per Chamber/End Cap ft³ (m³)

	Bare Unit Storage ft³ (m³)	Chamber/End Cap and Stone Volume — Stone Foundation Depth in. (mm)			
		9 (230)	12 (300)	15 (375)	18 (450)
MC-4500 Chamber	106.5 (3.02)	162.6 (4.60)	166.3 (4.71)	169.9 (4.81)	173.6 (4.91)
MC-4500 End Cap	35.7 (1.01)	108.7 (3.08)	111.9 (3.17)	115.2 (3.26)	118.4 (3.35)

NOTE: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter.

Amount of Stone Per Chamber

ENGLISH tons (yd³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-4500	7.4 (5.2)	7.8 (5.5)	8.3 (5.9)	8.8 (6.2)
End Cap	9.6 (6.8)	10.0 (7.1)	10.4 (7.4)	10.9 (7.7)
METRIC kg (m³)	230 mm	300 mm	375 mm	450 mm
MC-4500	6681 (4.0)	7117 (4.2)	7552 (4.5)	7987 (4.7)
End Cap	8691 (5.2)	9075 (5.4)	9460 (5.6)	9845 (5.9)

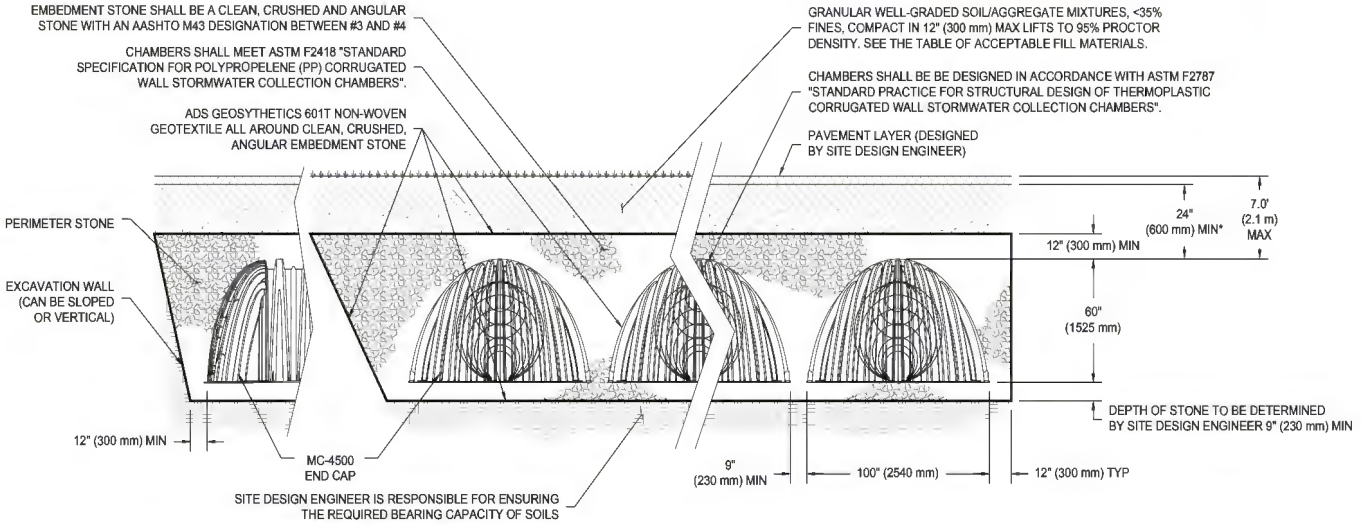
NOTE: Assumes 12" (300 mm) of stone above, and 9" (230 mm) row spacing, and 12" (300 mm) of perimeter stone in front of end caps.

Volume of Excavation Per Chamber/End Cap yd³ (m³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15"(375 mm)	18"(450 mm)
MC-4500	10.5 (8.0)	10.8 (8.3)	11.2 (8.5)	11.5 (8.8)
End Cap	9.3 (7.1)	9.6 (7.3)	9.9 (7.6)	10.2 (7.8)

NOTE: Assumes 9" (230 mm) separation between chamber rows, 12" (300 mm) of perimeter in front of end caps, and 24" (600 mm) of cover. The volume of excavation will vary as the depth of cover increases.

General Cross Section



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

Special applications will be considered on a project by project basis. Please contact our application department should you have a unique application for our team to evaluate.

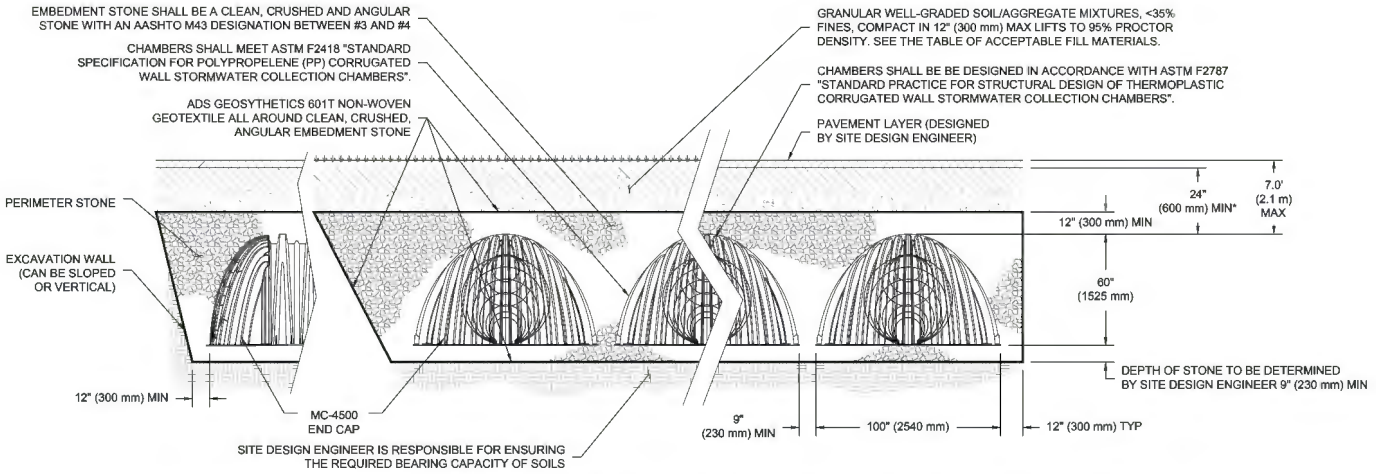
2.0 Foundations for Chambers

TABLE 2—MC-4500 Minimum Required Foundation Depth in inches (millimeters)
Assumes 9" (230 mm) row spacing.

Cover Hgt. ft. (m)	Minimum Bearing Resistance for Service Loads ksf (kPa)																								
	4.4 (211)	4.3 (206)	4.2 (201)	4.1 (196)	4.0 (192)	3.9 (187)	3.8 (182)	3.7 (177)	3.6 (172)	3.5 (168)	3.4 (163)	3.3 (158)	3.2 (153)	3.1 (148)	3.0 (144)	2.9 (139)	2.8 (134)	2.7 (129)	2.6 (124)	2.5 (120)	2.4 (115)	2.3 (110)	2.2 (105)	2.1 (101)	2.0 (96)
2.0 (0.61)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	18 (450)
2.5 (0.76)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	18 (450)	18 (450)	24 (600)
3.0 (0.91)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)
3.5 (1.07)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)
4.0 (1.22)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)
4.5 (1.37)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)	30 (750)	30 (750)
5.0 (1.52)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)	30 (750)	30 (750)	36 (900)
5.5 (1.68)	9 (230)	9 (230)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)	30 (750)	30 (750)	36 (900)	36 (900)
6.0 (1.83)	9 (230)	9 (230)	9 (230)	12 (300)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)	30 (750)	30 (750)	30 (750)	36 (900)	36 (900)	36 (900)
6.5 (1.98)	9 (230)	12 (300)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)	30 (750)	30 (750)	30 (750)	36 (900)	36 (900)	36 (900)	42 (1050)
7.0 (2.13)	12 (300)	12 (300)	12 (300)	12 (300)	15 (375)	15 (375)	15 (375)	15 (375)	18 (450)	18 (450)	18 (450)	24 (600)	24 (600)	24 (600)	24 (600)	24 (600)	30 (750)	30 (750)	30 (750)	30 (750)	36 (900)	36 (900)	36 (900)	42 (1050)	42 (1050)

NOTE: The design engineer is solely responsible for assessing the bearing resistance (allowable bearing capacity) of the subgrade soils and determining the depth of foundation stone. Subgrade bearing resistance should be assessed with consideration for the range of soil moisture conditions expected under a stormwater system.

FIGURE 10B—MC-4500 Structural Cross Section Detail (Not to Scale)



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

Special applications will be considered on a project by project basis. Please contact our applications department should you have a unique application for our team to evaluate.

3.1 Foundation and Embedment Stone

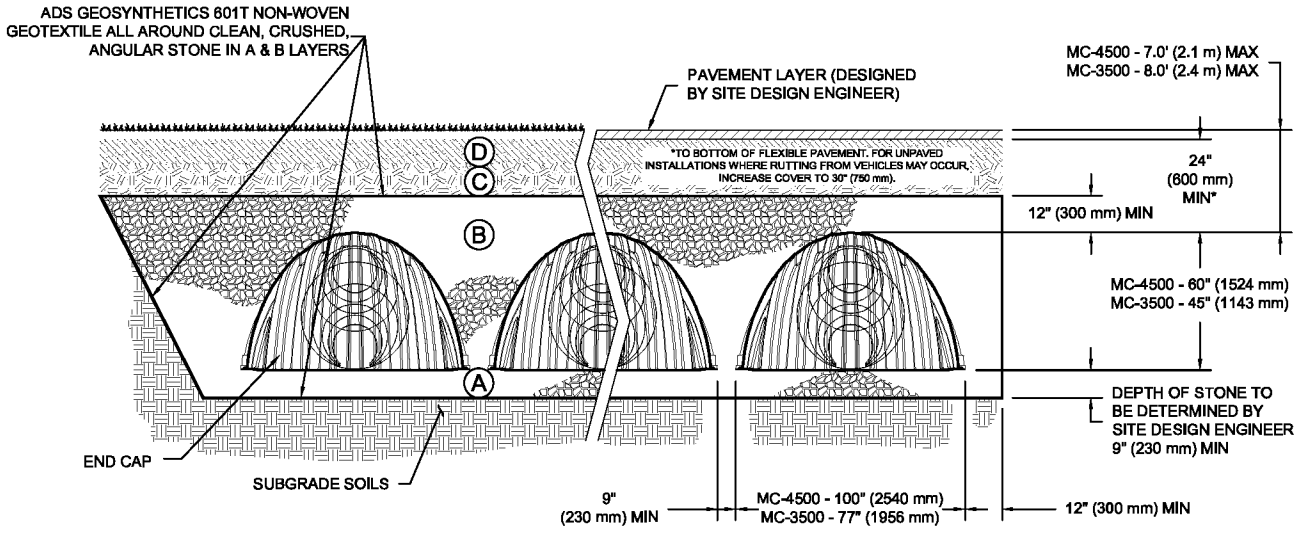
The stone surrounding the chambers consists of the foundation stone below the chambers and embedment stone surrounding the chambers. The foundation stone and embedment stone are important components of the structural system and also provide open void space for stormwater storage. **Table 3** provides the stone specifications that achieve both structural requirements and a porosity of 40% for stormwater storage. **Figure 11** specifies the extents of each backfill stone location.

TABLE 3—Acceptable Fill Materials

	MATERIAL LOCATION	DESCRIPTION	AASHTO DESIGNATION	COMPACTION/DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1,A-2-4,A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTOINS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDTIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL-GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FORM THE FOUDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2 3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.

FIGURE 11—Fill Material Locations



Once layer 'C' is placed, any soil/material can be placed in layer 'D' up to the finished grade. Most pavement subbase soils can be used to replace the materials of layer 'C' or 'D' at the design engineer's discretion.

4.1 GENERAL

StormTech subsurface chamber systems offer the flexibility for a variety of inlet and outlet configurations. Contact the StormTech Technical Services Department or your local StormTech representative for assistance configuring inlet and outlet connections.

The open graded stone around and under the chambers provides a significant conveyance capacity ranging from approximately 0.8 cfs (23 l/s) to 13 cfs (368 l/s) per MC-3500 chamber and 0.54 cfs (15 l/s) to 8.5 cfs (240 l/s) for the MC-4500 chamber. The actual conveyance capacity is dependent upon stone size, depth of foundation stone and head of water. Although the high conveyance capacity of the open graded stone is an important component of the flow network, StormTech recommends that a system of inlet and outlet manifolds be designed to distribute and convey the peak flow through the chamber system.

It is the responsibility of the design engineer to provide the design flow rates and storage volumes for the stormwater system and to ensure that the final design meets all conveyance and storage requirements. However, StormTech will work with the design engineer to assist with manifold and chamber layouts that meet the design objectives.

4.2 THE ISOLATOR® ROW

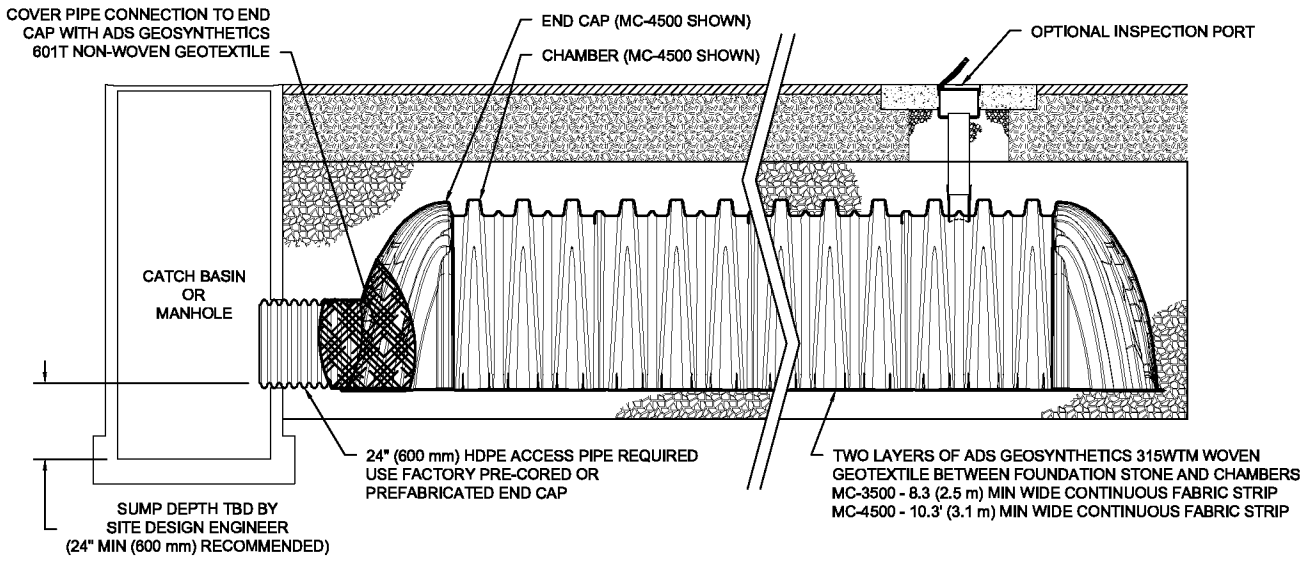
The Isolator Row is a patented system that inexpensively captures total suspended solids (TSS) and debris and provides easy access for inspection and maintenance. A double layer of woven geotextile between the bottom of the chambers and the foundation stone provides the filter media that satisfies most contaminant removal objectives. Each installed MC-3500 chamber and MC-3500 end cap provides 42.9 ft2 (4.0 m2) and 7.5 ft2 (0.7 m2) of bottom filter area respectively. Each installed MC-4500 chamber and MC-4500 end cap provides 30.1 ft² (2.80 m²) and 12.8 ft² (1.19 m²) of bottom filter area respectively.

The Isolator Row can be configured for maintenance objectives or, in some regulatory jurisdictions, for water quality objectives. For water quality applications, Isolator Rows can be sized based on water quality volume or flow rate.

All Isolator Rows require: 1) a manhole for maintenance access, 2) a means of diversion of flows to the Isolator Row and 3) a high flow bypass. Flow diversion can be accomplished by either a weir in the upstream access manhole or simply by feeding the Isolator Row at a lower elevation than the high flow bypass. Contact StormTech for assistance sizing Isolator Rows.

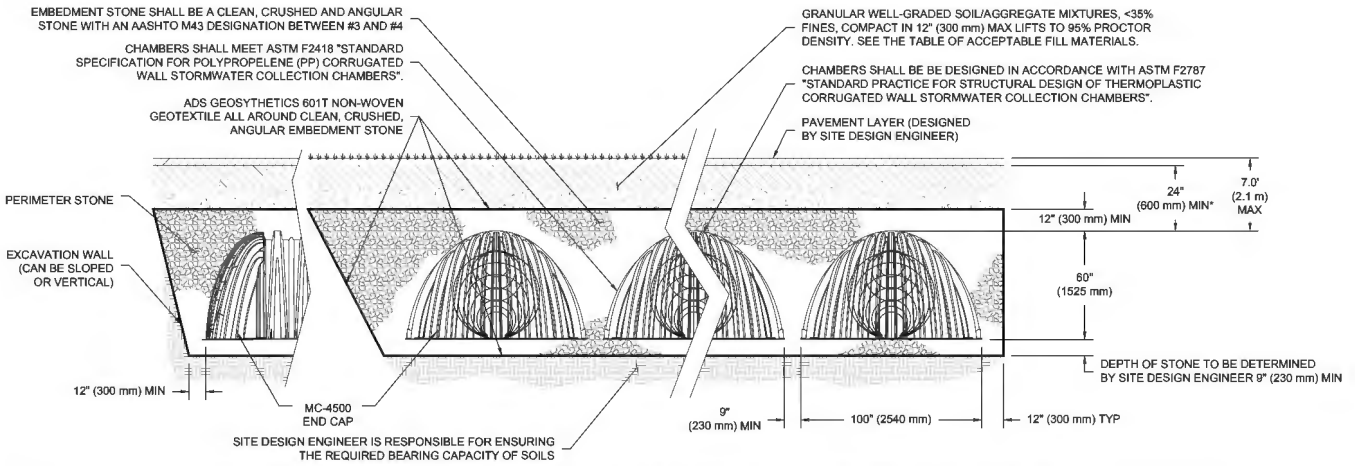
When additional stormwater treatment is required, StormTech systems can be configured using a treatment train approach where other stormwater BMPs are located in series.

FIGURE 12—StormTech Isolator Row Detail



7.0 Structural Cross Sections and Specifications

FIGURE 16—MC-4500 Structural Cross Section Detail (Not to Scale)



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Special applications will be considered on a project by project basis. Please contact our application department should you have a unique application for our team to evaluate.

MC-4500 STORMWATER CHAMBER SPECIFICATIONS

1. Chambers shall be StormTech MC-4500 or approved equal.
2. Chambers shall be made from virgin, impact-modified polypropylene copolymers.
3. Chamber rows shall provide continuous, unobstructed internal space with no internal panels that would impede flow.
4. The structural design of the chambers, the structural backfill and the installation requirements shall ensure that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met for: 1) long-duration dead loads and 2) short-duration live loads, based on the AASHTO Design Truck with consideration for impact and multiple vehicle presences.
5. Chambers shall meet the requirements of ASTM F 2418, "Standard Specification for Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers."
6. Chambers shall conform to the requirements of ASTM F 2787, "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers."
7. Only chambers that are approved by the engineer will be allowed. The contractor shall submit (3 sets) of the following to the engineer for approval before delivering chambers to the project site:
   - A structural evaluation by a registered structural engineer that demonstrates that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F 2418 must be used as part of the AASHTO structural evaluation to verify long-term performance.
   - Structural cross section detail on which the structural cross section is based.
8. The installation of chambers shall be in accordance with the manufacturer's latest Construction Guide.

Detail drawings available in Cad Rev. 2000 format at www.stormtech.com

Water Quality Volume Calculations

Water Quality Volume Calculations

Project	Arlington Self Storage	**Project #**	52816.00
Calculated by	MEA	**Date**	4/20/2022
Checked by	EKG	**Date**	2/7/2022

BASIN #1

Runoff from subcatchment areas PR-1, PR-3, PR-4

Water Quality Storm Runoff Depth	(in)	0.5
Total Impervious Area	(ft^2)	24,150

BASIN WQV:

Required Volume:

Runoff Depth to be Treated (in)	Required Volume (ft^3)
0.5	**1,006**

Provided Volume:

Elevation	Area (ft^2)	Cumulative Volume (ft^3)
69.1	1,341	0
71.6	1,341	**2,192**

** Per MassDEP Treatment Requirement*

TSS Removal Worksheets

TSS Removal Calculation Worksheet

101 Walnut Street
Post Office Box 9151
Watertown, MA 02471
P 617.924.1770

Project Name:	**Arlington Self Storage**	Sheet:	**1 of 2**
Project Number:	**52816.00**	Date:	**Janaury 4, 2022**
Location:	**Arlington, MA**	Computed by:	**SJH**
Discharge Point:	**DP-2**	Checked by:	
Drainage Area(s):	**PR-1, PR-3**		

1. Pre-Treatment prior to Infiltration

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**25%**	**100%**	**25%**	**75%**
Isolator Row	**25%**	**75%**	**19%**	**56%**
	0%	**56%**	**0%**	**56%**

Pre-Treatment TSS Removal = **44%**

2. Total TSS Removal including Pretreatment 1.

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**25%**	**100%**	**25%**	**75%**
Subsurface Infiltration Structure	**80%**	**75%**	**60%**	**15%**
	0%	**15%**	**0%**	**15%**
	0%	**15%**	**0%**	**15%**

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1. Removal rates for proprietary devices are from approved studies and/or manufacturer data (attach study or data source, or remove this sentence if not applicable).

** Equals remaining load from previous BMP (E)

*** Stormceptor sizing calculation gives a TSS removal rate of 87%. To be conservative, 80% removal is used for this calculation (Change name of device and the claimed removal rate shown on the calc. sheet. Remove this sentence if

Treatment Train TSS Removal = **85%**

101 Walnut Street
Post Office Box 9151
Watertown, MA 02471
P 617.924.1770

TSS Removal Calculation Worksheet

Project Name:	**Arlington Self Storage**	Sheet:	**2 of 2**
Project Number:	**52816.00**	Date:	**February 9, 2022**
Location:	**Arlington, MA**	Computed by:	**MEA**
Discharge Point:	**DP-2**	Checked by:	
Drainage Area(s):	**PR-4**		

1. Pre-Treatment prior to Infiltration

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Sediment Forebay	**25%**	**100%**	**25%**	**75%**
	0%	**75%**	**0%**	**75%**
	0%	**75%**	**0%**	**75%**

Pre-Treatment TSS Removal = **25%**

2. Total TSS Removal including Pretreatment 1.

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Bioretention Area	**90%**	**100%**	**90%**	**10%**
	0%	**10%**	**0%**	**10%**
	0%	**10%**	**0%**	**10%**
	0%	**10%**	**0%**	**10%**

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1. Removal rates for proprietary devices are from approved studies and/or manufacturer data (attach study or data source, or remove this sentence if not applicable).

** Equals remaining load from previous BMP (E)

*** Stormceptor sizing calculation gives a TSS removal rate of 87%. To be conservative, 80% removal is used for this calculation (Change name of device and the claimed removal rate shown on the calc. sheet. Remove this sentence if

Treatment Train TSS Removal = **90%**

Appendix E: Standard 7 Supporting Information

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The Project has been designed to comply with all ten of the Stormwater Management Standards. There is no required Standard 7 Supporting Information. This page intentionally left blank.

Appendix F: Standard 8 Supporting Information

Recommended Construction Period Pollution Prevention and Erosion and Sedimentation Controls

Proposed Self Storage Facility Project

34 Dudley Street

Arlington, Massachusetts, 02476

PREPARED FOR

PSI Atlantic Arlington MA, LLC
530 Oak Court Drive, Suite 155
Memphis, TN 38117

PREPARED BY

2 Bedford Farms Drive
Suite 200
Bedford, NH 03110
603.391.3900

February 2022
Revised April 21, 2022

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List of Tables

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Erosion and Sedimentation Control Plan

As part of the Site Plan Review and Notice of Intent process, an erosion and sedimentation control plan will be developed, and will include measures such as those described below.

Erosion and Sedimentation Control Measures

An Erosion and Sediment Control Plan has been designed to ensure compliance with the MassDEP Stormwater Management Policy and Town of Arlington Bylaws and Regulations. The Project will disturb less than 1-acre of land and not subject to the NPDES General Permit for Stormwater Discharges from Construction Activities. The following minimum performance standards have been included in the Erosion and Sediment Control Plan attached to this report.

1. Erosion control structures will be located at the edge of land disturbances and will be designed so as not to create point discharges onto abutting properties.
2. Dust from all earthmoving activities shall be controlled.
3. Earth materials shall not be deposited onto any roadways.
4. The amount of disturbed area shall be minimized. Natural resources shall protected.
5. Vegetative stabilization measures shall be employed during the Regulated Activity and construction activity as required by the approving authority. All perimeter dikes and slopes, basin or trap embankments shall be stabilized with sod, seed, anchored mulch within seven (7) days of disturbance. All other disturbed areas shall be stabilized with sod, seed and anchored mulch within fourteen (14) days after disturbing activities are ceased.
6. Topsoil shall be stripped from disturbed areas and stockpiled in an approved area and stabilized with a temporary vegetative cover if left more than fifteen (15) calendar days. Perimeter sediment controls shall be installed around stockpiled topsoil.

7. During cold weather months, when seeding and sodding may be impractical, anchored mulch shall be applied as approved.
8. All storm drain inlets shall be protected, and all newly constructed outlets shall be armored in accordance with the above-mentioned guidelines.
9. Perimeter controls shall be used at the site.
10. All construction site entrances and exits shall be stabilized to prevent off-site tracking.
11. Stormwater controls shall be inspected at consistent intervals, including during or immediately after a storm.
12. Construction site operators shall control all construction and waste materials.

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with EPA NPDES regulations.

Compost Filter Tube (Perimeter Control)

Siltsock shall be installed around the project work limits as perimeter controls. Siltsocks shall be as manufactured by *Filtrexx* or approved equivalent. Approved siltsocks shall be composed of 12 inch diameter biodegradable mesh netting and filled with a compostable material. When installing multiple sections of siltsock, each individual section shall overlap a minimum of 12 inches. Since siltsocks shall be installed on top of the ground, without being trenched in, the Contractor shall install a supplemental compostable material on the up-slope side of the siltsock, in order to prevent the flow of stormwater runoff beneath it.

Siltsocks will be inspected in compliance with the inspection schedule and maintained routinely throughout the duration of the project. The contractor must remove sediment before it accumulates to one-half of the above-ground height of any perimeter control. Additionally, sections of siltsock that appear to be damaged, removed, or of which the stakes have been removed, shall be repaired immediately upon observation.

Hay Bale Barriers

Hay bale barriers will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Bales will be set at least four inches into the existing ground to minimize undercutting by runoff.

Silt Fencing

In areas where high runoff velocities or high sediment loads are expected, hay bale barriers will be backed up with silt fencing. This semi permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and hay bale barrier will be replaced as determined by periodic field inspections.

Catch Basin Protection

Newly constructed and existing catch basins will be protected with hay bale barriers (where appropriate) or silt sacks throughout construction.

Gravel and Construction Entrance/Exit

A temporary crushed-stone construction entrance/exit will be constructed. A cross slope will be placed in the entrance to direct runoff to a protected catch basin inlet or settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the project site.

Diversion Channels

Diversion channels will be used to collect runoff from construction areas and discharge to either sedimentation basins or protected catch basin inlets.

Temporary Sediment Basins

Temporary sediment basins will be designed either as excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion.

Temporary Containment Berm

Temporary containment berm to be placed at the top of the existing slope at the southerly (rear) side of the property adjacent to Mill Brook to prevent and runoff during construction from flowing towards Mill Brook over disturbed areas. Contractor shall maintain this berm throughout construction prior to site stabilization. Berm shall be a minimum of one foot tall, one foot wide with 3:1 side slopes. Berm shall be inspected on a weekly basis and after each storm event.

Vegetative Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by hydro seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used

after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.
- The on site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on site by the contractor.
- Silt shall be removed from behind barriers if greater than 6 inches deep or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- The underside of hay bales should be kept in close contact with the earth and reset as necessary.
- Sediment that is collected in structures shall be disposed of properly and covered if stored on site.
- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary

The sedimentation and erosion control plan is included in project plan set; a reduced version and Erosion Control Maintenance checklist is included here for quick reference.

Spill Prevention and Response Plan

Spill prevention equipment and training will be provided by the Contractor.

Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

Facility Manager

Name:	_____	Home Phone:	_____
Phone:	_____	E-mail:	_____

Construction Manager

Name:	_____	Home Phone:	_____
Phone:	_____	E-mail:	_____

The supervisor will first contact the Fire Department and then notify the Police Department, the Public Health Commission and the Conservation Commission. The Fire Department is ultimately responsible for matters of public health and safety and should be notified immediately.

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees. A hazardous waste spill report shall be completed as necessary using the attached form.

Emergency Notification Phone Numbers

1. Facility Manager

Name:	_____	Home Phone:	_____
Phone:	_____	E-mail:	_____

Alternate

Name:	_____	Home Phone:	_____
Phone:	_____	E-mail:	_____

2. Fire Department

   Emergency: 911

   Business: _____

   Police Department

   Emergency: 911

   Business: _____

3. Cleanup Contractor

   Address: _____

   Phone: _____

4. Massachusetts Department of Environmental Protection
   - Emergency: _____
   - Northeast Region: _____
5. National Response Center
   - Phone: (800) 424-8802

   Alternate U.S. Environmental Protection Agency
   - Emergency: (800) 424-8802
   - Business: _____
6. Arlington Conservation Commission
   - Contact: _____
   - Phone: (781) 316-3090
7. Arlington Health Department
   - Contact: Natasha Waden (Director)
   - Phone: (781) 316-3170

Hazardous Waste / Oil Spill Report

Date	_____	Time	_____	AM / PM	
Exact Location (Transformer #)	_____				
Type of Equipment	_____	Make	_____	Size	_____
S/N	_____	Weather Conditions	_____		
On or near water	☐ Yes ☐ No	If Yes, name of body of water	_____		
Type of chemical/oil spilled	_____				
Amount of chemical/oil spilled	_____				
Cause of spill	_____				
Measures taken to contain or clean up spill	_____				
Amound of chemical/oil recovered	_____	Method	_____		
Material collected as a result of cleanup:					
_____	Drums containing	_____			
_____	Drums containing	_____			
_____	Drums containing	_____			
Location and method of debris disposal:					
_____					
Name and address of any person, firm, or corporation suffering damages:					
_____					
Procedures, method, and precautions instituted to prevent a similar occurrence from recurring:					
_____					
Spill reported to General Office by	_____	Time	_____	AM/PM	
Spill reported to DEP / Natrional Response Center by				_____	
DEP Date	_____	Time	_____	AM/PM	Inspector _____
NRC Date	_____	Time	_____	AM/PM	Inspector _____
Additional comments:	_____				

Assessment – Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. A list of recommended spill equipment to be kept on site is included on the following page.

Fire / Police Department:		911
Arlington Health Department:		(781) 316-3170
Arlington Conservation Commission:		(781) 316-3090

Emergency Response Equipment

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

Supplies		Recommended Suppliers
SORBENT PILLOWS/"PIGS"	2	http://www.newpig.com
SORBENT BOOM/SOCK	25 FEET	Item # KIT276 — mobile container with two pigs, 26 feet of sock, 50 pads, and five pounds of absorbent (or equivalent) http://www.forestry-suppliers.com
SORBENT PADS	50	
LITE-DRI® ABSORBENT	5 POUNDS	
SHOVEL	1	Item # 33934 — Shovel (or equivalent)
PRY BAR	1	Item # 43210 — Manhole cover pick (or equivalent)
GOGGLES	1 PAIR	Item # 23334 — Goggles (or equivalent)
GLOVES – HEAVY	1 PAIR	Item # 90926 — Gloves (or equivalent)